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MONTHLY INTERNATIONAL FEATURE ISSUE

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The OIL WEEKLY

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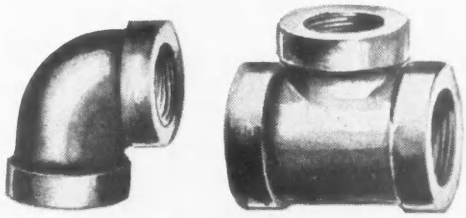

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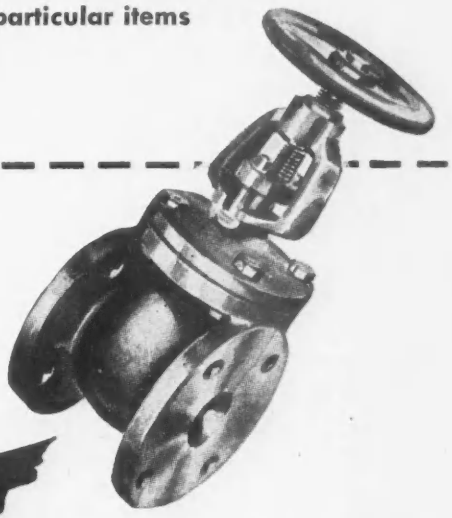

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Looking Ahead

WITH THE EDITOR

PRODUCTION in the Greater Seminole area of Oklahoma, long one of the foremost crude producing areas in that state, has been increased during the last 1½ years as the result of a drilling campaign that located approximately 100 discoveries or field extensions in sectors previously thought exhausted.

Seminole pool was discovered in 1925 and at that time was confined to a small area in Seminole County. Further exploration and drilling gradually extended this area into the five-county region now known as Greater Seminole. The counties in this area are Seminole and portions of Pottawatomie, Pontotoc, Hughes and Okfuskee.

While developing this area in early days, the primary aim of the operator was to drill as quickly as possible to the Wilcox pay sand and complete. In the haste, many promising formations in the shallower Pennsylvanian were overlooked.

During the last few years production from the Wilcox in the area has declined steadily to the point where Greater Seminole took a second place position in Oklahoma's production picture. Operators in the area, mostly independents, became alarmed over the prospect of exhausted leases, and sent geophysical crews to make additional pictures of the area. In addition, geologists began to examine back records of old wells. As a result of this additional exploration and study, many new discoveries and extensions have developed during the last 18 months.

William P. Sterne, staff writer, discusses these important new developments in "Revival of Greater Seminole Area Highly Successful," to appear in next week's issue of THE OIL WEEKLY.

THE OIL WEEKLY, published every Monday. Entered as second class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879.

Specialized Oil Publications of
THE GULF PUBLISHING COMPANY
Box 2608, Houston (1), Texas

The OIL WEEKLY and The COMPOSITE CATALOG
for the drilling-producing-pipe line industry

PETROLEUM REFINER and The REFINERY CATALOG
for the refining-natural gasoline industry

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Published every Monday. Single copies 25 cents (except special issues). Subscription price: domestic and foreign, $2 a year; 2 years, $3; 3 years, $4. Advertising rates on application. Copyright 1946 by The Gulf Publishing Company.

The OIL WEEKLY
ENGINEERING NEWS STATISTICS
R. L. DUDLEY, President, Publisher A. L. BURNS, General Manager

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THE CHANGING Panorama

Better Well-Head Gas Price Needed

THE philosophy of higher well-head prices to eliminate flare gas and act as a stimulus to the presently improving conservation picture is the key to the future of the gas industry.

This opinion was expressed by Dr. Frank H. Dotterweich of Texas A. & I. College at the meeting of the Independent Natural Gas Association of America.

State legislation up to the present time, he said, has brought about improved conservation practices, and should additional legislation be needed to effect maximum conservation it also should be state controlled.

"Only in this way can commensurate compensation for business risks in natural gas production be assured, thereby permitting maximum benefits for the nation from this natural resource through production combined with conservation," Dr. Dotterweich declared.

How NOT to Sell In South America

A SPEAKER at the Tulsa Nomads chapter recently warned manufacturers of oil field equipment that they'd better shake a leg if they are to meet the competition of British, Dutch and Russian exporters for the choice South American market. The speaker asserted that foreign competition poses a real threat to the American manufacturer.

Subsequently a representative of Yacimientos Petroliferas Fiscales, the government-owned Argentine oil company, who was in this country to buy oilfield equipment, gave a tip that some American manufacturers are definitely not acquainted with even the rudiments of foreign export or foreign psychology:

"The Argentine government plans must spend a substantial sum for oil field equipment since it controls 50 percent of the country's production and plans considerable development work. But, when an official representative of our government is told by an American manufacturer to put the money in escrow before he will even quote price, then you can be certain that that manufacturer is not going to get YPF business."

Regardless of political considerations, Argentina has been doing business with the British on a satisfactory basis for many years and it is time that American manufacturers and exporters became aware of this. Credit facilities can easily be established if the exporter will take the trouble to do so and try to remember that South Americans resent the implied slur to their integrity. Otherwise, much of this business is going to the British, the Dutch and the Russians who generally seem to have a better understanding of Latin psychology.

Trend to Diesels

LABOR trouble among coal miners is stimulating the sale of diesel engines as independent suppliers of power, Harvey T. Hill, executive director of the Diesel Engine Manufacturers Association, declared last week.

Citing the government's order that coal-burning railroads cut their passenger service 25 percent, Hill pointed out that railroads with dieselized equipment were maintaining full schedules. Recurring threats of coal strikes have accelerated railroads' conversion of steam locomotives to diesel, Hill said.

He said that mills, factories of various types, office buildings, hotels, large department stores and small retail establishments are installing their own diesel-driven power and light plants in increasing numbers.

* * *

Sixty-five percent of the total tonnage of overseas shipping for war purposes consisted of gasoline, oil and other petroleum products. —STEEL IN THE WAR.

Gulf of Mexico Oil Development Likely

THE subsurface rocks underlying the Gulf of Mexico will have to be reckoned with in estimating oil and gas reserves.

E. DeGolyer, geologist, has stated that certain portions of the Gulf of Mexico are favorable to the finding of thick sand bodies, and that structural conditions are known to exist. This vast area also is near known petroliferous province.

Studies of the 5000 square mile area within the 30-foot water depth contour from the Sabine River to the Mississippi River indicate at least 30 structures should be present, DeGolyer said. Geophysical mapping has definitely shown the existence of at least six piercement type domes and 12 additional structures.

It is unbelievable, he said, that the drill will not uncover large quantities of underground gas, oil and condensate in the Gulf of Mexico.

There is no way of telling how much reserves will be proved when the structures are drilled. But as a gauge, large fields, such as Paradis, Erath, Bateman Lake and Bayou Sale, are adjacent to the shore of the Gulf and lie just north of this huge unexplored oil territory.

Incidentally, it looks like Texas favors platting on a grid scale its offshore lands to the 27-mile limit so as to be ready when there is sufficient demand to warrant a lease bid-taking on that area. Heretofore, lands on auction have not extended past the three-mile limit, but 1941 legislation extended Texas' claim to the 27-mile line. Louisiana under a similar law is leasing out to 27 miles offshore and has one well drilling seven miles out in the open Gulf.

* * *

Lacking compressor stations, tie-in loops and the necessary valves and manifolds, the Big-Inch lines as a coercive in the coal strike situation is about as valuable as a revolver when the man "threatened" knows that the cylinder is missing.

The Week's News

PLANS for the immediate use of the Big Inch pipe lines to move 50 million cubic feet of gas daily to hard-pressed areas in Ohio and Pennsylvania were laid before the House Surplus Property Committee. Contentions that the lines could be used for peacetime oil movement were declared "pure romance" on the part of War Assets Administration men obsessed with the idea they must break up an alleged "oil monopoly." Story below.

Fuel Oil Use Increases—Shift of industry from coal to other fuels will be accelerated as a result of the coal strike, it is indicated by information coming in to the Bureau of Mines. Page 15.

Carbon Black Survey—The Texas Railroad Commission will consider various charges and changes in the carbon black manufacturing setup, a major industry of the Panhandle, when permits for continued operation come up for renewal December 19. Page 14.

California Tax Ruling—California oil companies selling their products abroad will be saved from the state sales tax under a ruling by the Supreme Court that the levy in such cases is in violation of the constitutional prohibition upon the imposition of export taxes by the states.

RMOGA Officers—James Donoghue succeeds Paul Stock as head of the Rocky Mountain Oil and Gas Association for the coming year. Page 16.

Fuel Oil Supply Sufficient—Acting Director Ralph K. Davies of OGD has declared that stocks of industrial and distillate fuel oils are such that, together with other factors, they will meet the demands of the coal-starved East. Page 15.

Estimate for December—The Bureau of Mines is expected to estimate a needed daily crude output of 4,680,000 barrels daily in December, a cut of 50,000 barrels from the November forecast, seeing little prospect of the coal strike resulting in any immediate big increase in demand for petroleum products. Page 15.

Tax Collections Drop—Treasury revenue from the three oil taxes for the first ten months of this year was nearly $45 million short of receipts in the corresponding 1945 period, with only the levy on pipe-line transportation showing an increase. Page 16.

Oil Field Equipment Value—In its first report on the production of oil-field equipment, the Census Bureau disclosed that shipments in June by 63 manufacturers representing 80 percent of the industry were close to $13.5 million. Story below.

Lost Steel Production—The first week of the coal strike brought the loss of more than 400,000 tons in steel production, with further and deeper cuts in the immediate offing. Page 15.

Criticism of WAA Big Inch Handling Mounts as Gas Movement Plan Talked

Plans for the emergency transport of gas through the Big Inch pipe lines to make a minute but possibly vital contribution to the fuel supply in the East were laid before the House Surplus Property Committee last week as criticism of the policies and procedures of the War Assets Administration continued to mount.

The proposal was offered by spokesmen for Tennessee Gas and Transmission Company, which is not a bidder for the wartime systems, and Trans-Continental Gas Pipe Line Company, which made a firm cash offer of $85 to $82 million for the facilities.

Meanwhile, Colonel Ernest O. Thompson of the Texas Railroad Commission, gave strong support to permanent use of the lines for gas, declaring if a market could be developed for casinghead gas now being flared, it would give the producers a return for the gas and make possible the adoption by the commission of stringent conservation regulations.

Texas Oil Not Available

Thompson told the committee that sufficient oil could not be found in Texas to make operation of the lines in oil service economically feasible, to that extent agreeing with Claude A. Williams of Trans-Continental, who testified that he had contacted large and small producers in Texas to see if oil could be had for the Little Big Inch, without success. His company made an alternative bid to use the Big Inch for gas and the Little Big Inch for oil, he said, but its commitments were from a field in Louisiana being developed, and a line may be built into that field before any deal for the government properties is consummated, at the rate of progress WAA is making.

Thompson told the committee there is plenty of gas available in Texas, and emphasized that his interest in the matter was purely from the standpoint of conservation.

Lashing out against WAA, Williams asserted that officials' talk of using the lines for oil is "pure romance" and charged that men handling the disposition of the facilities were "obsessed" by the idea that they had an injunction to break an "alleged oil monopoly" which they had conjured up.

In the past many years, he said, there has "never been an independent pipe line common carrier of oil that has not gone broke."

Says Three Weeks Required

Williams said the lines could be used for gas immediately, and within three weeks could be delivering 50 million cubic feet daily to hard-pressed gas companies in Ohio and Pennsylvania. This would be accomplished, he explained, by putting the gas into the lines in Texas and Louisiana at 800 to 1000 pounds pressure and letting it move through at that pressure to the East Coast where it would come out at around 50 pounds. By putting in one portable compressor, he said, deliveries could be boosted within 90 days to 225 million cubic feet daily. The project would cost about $250,000 and, if continued for a period of four months, might show a profit although, he said, "we wouldn't make a great deal of money out of it."

Former Senator Robert J. Bulkley, representing Big Inch Natural Gas Transmission Company, disclosed that he had approached WAA with a proposition of this nature. Bulkley testified that an initial attempt for a conference with Administrator Littlejohn was unsuccessful, and injected a new feature into the hearings when he said he had been referred to the Interior Department.

Bulkley revealed that following earlier testimony of Littlejohn's refusal to see him, the latter had made an appointment to meet him this week.

Robert W. Burns, special assistant to Littlejohn, confirmed Bulkley's version of his attempts to see the administrator,

June Oil-Field Equipment Shipments Shown in Report

June shipments of oil-field machinery and tools by 63 manufacturers, estimated to account for approximately 80 percent of the total output, reached a value of $13,443,000, and other products, mainly iron and steel finished goods, and machinery other than electrical, brought the total for the reporting plants to $14,628,000, it is reported by the Census Bureau.

The bureau report showed that 19 plants in Texas made shipments totaling $7,445,000, of the $9,183,000 worth of oil-field equipment shipped by 27 plants in the South. Shipments of 20 manufacturers in the northeastern and north central area totaled $3,354,000, and 16 plants in California reported $2,091,000.

and Assistant Secretary of the Interior C. G. Davidson disclosed that consideration was being given the emergency use of the lines to move gas to alleviate the coal shortage.

Questions Dodged

Davidson dodged all of the committee's questions, explaining that there were factors of material supply, gas and dehydration facilities, etc., to consider before the department made any decisions, first as to the feasibility of using the lines and, second, how they were to be used.

Under questioning by Representative Rizley of Oklahoma, the assistant secretary said no decisions had been reached on any point. However, he proved so evasive when the Congressman asked him whether the department did not fear it would further antagonize John L. Lewis if the lines were used and possibly endanger a solution of the miners' controversy, that Chairman Slaughter told him flatly that he hadn't given the committee any help.

Declaring that during the emergency the government should take the lines over for use, Rizley asked Davidson why that could not be done and operation assigned to experienced gas men. Davidson, who said that matter was under consideration, explained that the Interior Department did not feel it had any authority with respect to permanent disposition of the lines, other than the possible right to make recommendations from the standpoint of conservation, but that since Krug was Solid Fuels Administrator it might have some authority to use the lines temporarily.

He said that WAA and the Federal Power Commission had been asked for technical information, and both agencies were "cooperating," but at the close of his testimony Chairman Slaughter declared his statements so unsatisfactory that the committee would ask Secretary Krug to appear.

Krug Is Subpoenaed

As the hour for Krug's appearance passed without any word from the Secretary, Slaughter and his committee went into executive session, at the end of which the chairman announced Krug would be subpoenaed to appear December 2. Congressional attaches said they could not recall that a subpoena had ever been resorted to in the case of a Cabinet member, but Slaughter explained that Krug had "not even called either the chairman, the chief counsel or any member of the committee to explain his inability to be here."

The implications were that Krug felt discussion of the immediate use of the lines for gas might impede negotiations for settlement of the coal strike, but Slaughter commented that such use "might serve an indirect beneficial purpose by letting Lewis know natural gas can be moved through the lines and they might be so used permanently."

Stripper Well Angle

A man who should know told the committee that to use the pipe lines for oil would endanger stripper-well operators throughout the Middle West and likely lead to the premature abandonment of large numbers of such producers.

He was J. Howard Marshall, president of the Ashland Oil and Refining Company, who, as assistant deputy administrator and general counsel of PAW, actively participated in the planning of the construction and wartime operation of the lines.

Marshall intimated that some of the bidders for the lines, at least, contemplated using them to move imported oil. Arabian oil, he testified, could be landed at New York and moved down through one line and Venezuela oil, landed on the Gulf, could be moved up through the other, putting the Middle West industry practically out of business and endangering operations in the Southwest as well.

Marshall said no Midwest refiners with crude sources in the South would move their oil through the lines and that the major companies naturally preferred to send their oil to their own refineries and make their own products, as he would if he were a major.

The former PAW official emphasized the unlikelihood of supplying the lines by recalling that during the war it took the "full force of government," by directive and order, to keep the lines filled.

The committee this week plans to hear, in addition to Krug, Ralph K. Davies, acting director of the Oil and Gas Division; former Secretary Harold L. Ickes, former Reconstruction Finance Corporation head Jesse Jones; WAA Administrator Littlejohn, and representatives of the railroads, coal miners and coal operators.

Standard (Ohio) Promotes Swensrud, Three Others

Sidney A. Swensrud has been appointed executive vice president of Standard Oil Company (Ohio) and Earl D. Wallace and Samuel H. Elliott have been elevated to vice presidents. The promotions came when the company's production, supply and transportation department was separated into three main departments.

The production now will be under Wallace, transportation under Elliott and supply and distribution under Richard C. Sauer. Swensrud will have general charge of the three new departments as well as of the manufacturing department.

Swensrud joined Sohio as assistant to the president in 1928 after graduation and service on the staff of the Harvard Graduate School of Business Administration, and has been a vice president of The Standard Oil Company (Ohio) since August, 1939, in charge of production, transportation and supply. He is a University of Minnesota graduate.

Wallace joined Sohio in October, 1942, as land and production manager in the crude oil production division of the production, supply and transportation department. Prior to that, he had been active in Petroleum Exploration Company and The Wiser Oil Company and a resident of Lexington, Ky. He was graduated from the University of Kentucky in mining engineering in 1921.

Elliott was graduated from the University of Kansas in civil engineering in 1924 and from the Harvard Graduate School of Business Administration in 1929. He joined Sohio that year. In 1934 he was named purchasing agent and in 1938 became assistant to Swensrud. He became manager of transportation operations in 1943. He is a vice president of Sohio Pipe Line Company.

Sauer, a vice president of Sohio Petroleum Company, started with Sohio as an office boy before he was 17 and has served in several departments. During the war for two and a half years he was assistant director of supply for PAW.

Alfred E. Wolf has been appointed administrative assistant to the new executive vice president.

Buchanan to Head Sohio's New Gulf Coast Division

George S. Buchanan, manager of the Houston district of the Sohio Petroleum Company, has been named general manager of the Gulf Coast Division of the company, and Frank H. Willibrand, general superintendent of the production operations, Oklahoma City division, has been named general manager of the firm's Mid-Continent Division.

The newly created Gulf Coast Division consists of the Houston, Shreveport and Jackson districts, and the Mid-Continent Division is made up of the Oklahoma, Kansas, North and West Texas Districts. The new organization plan went into effect December 1.

Chester Smith Is Named Jersey Vice President

Chester F. Smith has been named a vice president of the Standard Oil Company (New Jersey). Smith, a director, has been with the company for 35 years and for the past two years he has been chairman of the firm's coordination committee, a central study and advisory group for the management of companies in the Jersey group. Previously, he was president of the Standard Oil Company of New Jersey, principal refining and marketing subsidiary of the parent company.

Miller Succeeds Lamb In Bureau of Mines

Thomas H. Miller, assistant chief of the economics and statistics branch since January, 1945, has been appointed assistant director of the Bureau of Mines, succeeding George A. Lamb, who resigned in October to enter private industry.

Miller, a native of Austin, Texas, has been associated with the bureau for nearly 20 years, coming to Washington from the Salt Lake City office in May, 1940.

Tidelands Argument

Arguments on pleadings in the government's tidelands suit against the state of California likely will be held in February, U. S. Supreme Court attaches have indicated.

Carbon Black Situation in Texas To Be Surveyed by Rail Commission

A comprehensive survey of Texas' carbon black industry is scheduled with detailed information to be considered by the Texas Railroad Commission at December 19 hearing in Austin. The hearing is the customary annual affair at which operating permits, which expire January 1, are up for renewal. However, recent information, particularly with regard to operations in the Panhandle field where 68 percent of the nation's carbon black is produced, has caused increased concern among members of the state's regulatory body.

Commission Chairman Olin Culberson is particularly interested in the relative merits of channel as compared with furnace type plants. His information indicates that recovery from channel plants is from one to two pounds of black per thousand cubic feet of gas, whereas furnace plants obtain 10 to 14 pounds from the same volume. Representatives of the B. F. Goodrich and Seiberling companies, however, testified at a recent hearing in Amarillo that furnace black is 35 percent less efficient than channel black for tire making purposes.

Culberson's Question

Culberson's thinking on this difference is revealed by a question he asked one of the tire company representatives: "Would it be better for the American people to have tires of 100 percent efficiency for awhile, or tires of 65 percent efficiency 10 times as long?"

The Amarillo hearing brought out charges that some plants are getting less than the legal limit of one pound of black per Mcf. The commission will check into this also, before issuing new operating permits.

Evidence indicates that the new desulphurizing process will permit sour gas to enter into competition with the naturally sweet. This, of course, should decrease the demand and consequently the price of the sour type so that carbon plants may find that improved manufacturing methods, greater recovery, and a better product are necessary.

Statute Called Useless

Railroad Commissioner Ernest O. Thompson says there is no further need for Article 6008A of the Texas statutes since the de-sulphurizing process has proved a success. It is under this article that carbon black manufacturers now use the limit of 750 million feet of sour gas daily.

The commission has asked the black plant operators to have detailed information for the hearing in its offices by December 12. This includes the throughput capacity of plants, type of plant, daily average gas consumed, and recovery of black per Mcf.

Synthetic-Natural Rubber Ratio Must Be Maintained

Currently increased imports of natural rubber will not permit further relaxation of natural-synthetic ratios because of indications of increasing demand, it was warned last week by Civilian Production Administrator John D. Small in his monthly report.

Small said that August and September consumption was at the rate of 90,000 long tons a month, and appeared likely to go even higher in October and subsequent months.

"At the projected high levels of rubber consumption," he said, "this will still mean use of some 55,000 long tons of synthetic rubber per month—a rate well above the long-range minimum advocated by the inter-agency policy committee for rubber." However, he added, reconversion in some segments of the industry is already nearing the two-thirds natural, one-third synthetic ratio contemplated by the committee as an average usage ration.

Estimates on natural rubber for 1947, Small said, suggest that imports next year may reach a rate of 50,000 tons per month, compared with a projected new rubber usage of almost 90,000 tons. Since rubber stocks must be built up to support higher levels of usage and strategic reserves must be maintained, it appears that relaxation of usage controls cannot go much beyond the present ratios.

AIME Section Meet Slated for New Orleans

The first technical program of the recently organized Southern Section of the American Institute of Mining and Metallurgical Engineers will be held in New Orleans, December 6.

Dr. Norris Johnston, Magnolia Petroleum Company, Dallas and Los Angeles, will speak on "Effect of Completion Practices on Productivity Indices." A review of the past year's developments in the Petroleum Division of AIME, will be given by Charles B. Carpenter, of the Bureau of Mines, Dallas.

Dan L. Marshall, The Texas Company, New Orleans, is chairman of the section.

Compact Agent

Lawrence D. Ransom, secretary of the Texas Railroad Commission, will be appointed Interstate Oil Compact Commission agent for Texas, Governor-elect Beauford Jester said last week.

Secretary Ransom has held the Railroad Commission post for the past four years. Prior to that he was court deputy at Corsicana and previous to the job as court deputy he managed a radio station.

L. D. Ransom

Heat Content of Nation's Gas Reserves Is Estimated

Heat content of the nation's natural gas reserves is equal to 26,307 million barrels of oil, or more than 26 percent of the present estimated proved oil reserves, R. C. Jopling, vice president, Phillips Petroleum Company, cites in a study of gas reserves forwarded to Secretary of the Interior Krug.

In his study, Jopling said that proved gas reserves of the nation amount to nearly 148 trillion cubic feet, of which 75 percent is in gas pools and the remainder in oil pools. On a BTU basis, Jopling said gas reserves are equal to about 6 billion tons of coal.

Carter Plans Expansion Of Research Facilities

The Carter Oil Company will spend approximately $225,000 in enlarging its research laboratory and shops in Tulsa, work to start immediately with completion scheduled late next summer.

The new construction will more than double the present research center which has made many outstanding contributions, including the famous wartime proximity fuse and also an oil pool analyzer which was made available to the oil industry without cost.

Laboratory space will be increased from 18,000 to 38,000 square feet by the construction of a two-story building which will be utilized for manufacturing and assembling some of the geophysical equipment developed and manufactured by Carter and in use throughout the world.

Texas Spacing Decision

The substantial evidence rule was upheld last week when the Texas Supreme Court overruled a motion for rehearing in the Thomas vs. Stanolind and the Trapp vs. Shell cases.

Apparently the only means of contesting a Railroad Commission spacing rule is on an allegation that the commission's rule is not supported by substantial evidence. If the evidence is substantial, the courts must assume that the commission's order is justified.

Lease Tracts Withdrawn

Two hundred tracts of offshore land are being withdrawn from the Texas school land lease sale scheduled December 3 in Austin, these being tracts numbered from 248 to 448, inclusive, in Laguna Madre. Some question as to boundaries of the tracts, which cover 125,000 acres, must be settled before lease sale. Still on schedule for the sale are tracts covering 210,000 acres.

Texas Gas Hearing

The final hearing before the Texas Senate Gas Resources Investigation Committee will be held in Carthage, on December 14, when conditions in fields as they affect royalty and land owners, will be considered. Lease provisions, particularly, will be explored.

Coal-to-Oil Move Accelerated

A shift from the use of coal to oil as an industrial fuel, well under way even before the war, has been speeded up by coal mine interruptions. Bureau of Mines statistics show that the coal industry rapidly is losing the increased markets which it gained through wartime restrictions on conversions and the use of oil.

Those figures show that the proportion of the total mineral fuel supply represented by coal dropped from 53.3 percent in 1936 to 49.3 percent in 1940, although much of this decline was not due to loss of markets but to new facilities which went directly to the use of other fuel. Wartime restrictions on oil brought coal back to the 53.3 percent mark in 1944, but in 1945 it had dropped to 51.3 percent.

Meanwhile, conversions and new installations brought oil up from 29.6 percent in 1936 to 35.1 percent in 1938. It dropped to a wartime low of 28.2 percent in 1942 but in 1944 had recovered to 30.7 percent, jumping to 33.1 percent in 1945. The contribution of natural gas increased only slightly, from 10.2 percent in 1936 to 11.3 percent in 1945.

Steel Production Drops As Coal Strike Persists

More than 400,000 tons of badly needed steel production was lost last week by the curtailment necessitated by the coal strike, and operations were down to 68 percent as compared with a high of 91.4 percent of capacity just prior to the walkout. Industry spokesmen warned that this was only the beginning and the curtailment would accelerate rapidly should the strike be prolonged.

During the first half of the year approximately 12,000,000 tons of finished steel was lost because of strikes and work stoppages, but from the middle of the year up to the latest interruption production was maintained at a high level.

Equally as important as the lack of coal is the threat of a nationwide freight embargo, which many railroad men predict will come this week.

To add to the difficulties of the situation, the steel industry may be in for trouble of its own within three months, when steelworkers' union contracts expire. If the coal strike is prolonged many furnaces which have been banked likely will not be started up again until the outcome of negotiations with the steel unions is known.

Unfinished Tankers Are Offered at Jacksonville

The U. S. Maritime Commission will open bids December 9 for the sale of seven uncompleted tankers at Jacksonville, Fla. The tankers, of the T1-M-BT1 type, were designed to be 325 feet in length, with a 48-foot beam and 19-foot draft, powered by 1400 horsepower engines, and to have a capacity of 31,400 barrels.

Plan for Military Group In NPC Setup Agreed Upon

The agreement on a plan for the establishment of a military committee in the National Petroleum Council, an advisory group to the Department of Interior's Oil and Gas Division, has been reached between the OGD and the Army-Navy Petroleum Board.

A committee of 12 members, chosen entirely on the basis of their capabilities as individuals and not necessarily members of NPC, is contemplated. Within the group, headed by an industry man and seconded by a representative of the military, would be sub-committees and specialists in various fields.

Interior officials will have the plan in writing to submit for NPC approval at its next meeting January 21.

Crude Oil Production in the United States

(Estimates compiled by THE OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED Nov. 30	Nov. 23
Alabama	1,000	1,100
Arkansas	73,350	73,400
California	871,400	876,700
Colorado	38,000	35,750
Florida	*	*
Illinois	205,200	202,200
Indiana	18,900	19,250
Kansas	275,500	280,700
Kentucky	30,000	30,050
Louisiana	401,600	400,850
North Louisiana	92,250	91,500
South Louisiana	309,350	309,350
Michigan	48,000	45,000
Mississippi	80,550	79,550
Missouri	100	100
Montana	23,300	23,600
Nebraska	750	750
New Mexico	101,000	101,000
New York	13,500	13,500
Ohio	7,900	8,500
Oklahoma	367,500	366,900
Pennsylvania	36,100	36,600
Tennessee	35	35
Texas	2,096,755	2,096,755
Tex. R. R. Comm. Districts:		
Dist. 1—S. Central	18,985	18,985
Dist. 2—Lower Gulf Coast	147,200	147,200
Dist. 3—Upper Gulf Coast	464,325	464,325
Dist. 4—S. West	226,325	226,325
Dist. 5—E. Central	36,835	36,835
Dist. 6—E. Texas Field	324,000	324,000
Dist. 6—Rest of N. East	105,075	105,075
Dist. 7-B—W. Central	35,300	35,300
Dist. 7-C—West	29,510	29,510
Dist. 8—West	507,250	507,250
Dist. 9—N. Central	121,400	121,400
Dist. 10—Panhandle	80,550	80,550
West Virginia	8,000	8,900
Wyoming	105,500	106,000
Total United States	4,803,940	4,807,590

* Wells shut-in.

Stocks of Industrial Fuel Oils Declared Sufficient

Interruption of coal production poses no supply problem for oil industry, whose stocks of industrial and distillate fuel oils were declared by Acting Director Ralph K. Davies of the OGD to be adequate for all winter needs.

Following conferences with oil industry advisers, Davies said the stoppage of coal supplies may increase heavy fuel oil consumption by utilities and industrial plants by 1½ to 3 million barrels a month, but pointed out that the increase would be offset to a large extent by a decline in demand in other quarters, notably in requirements for ship bunker oil.

Stocks of residual fuel east of the Rockies at midmonth were 31 million barrels, 10 million barrels above a year ago. Demand for some time has been light, principally as a result of the shipping strikes and the reduction of Navy funds, which necessitated a drop in Navy purchases this quarter from an anticipated 9 million barrels to half that amount.

If by any chance demand exceeds supply, Davies said, additional oil could be obtained, but at higher cost, by increasing the yield in domestic refineries or by rearrangement of foreign routings and drawing more heavily on Caribbean sources.

The major problem, he said, will be that of transportation for producing fields to refineries, and refineries to consuming areas, and the OGD now is developing this phase of the situation with other governmental agencies.

Cutback in Production Foreseen for December

The Bureau of Mines estimate of demand for crude oil for December expected within a few days, likely will show no increase as result of the coal strike. Further seasonal and other cutbacks in several states is expected to bring the level of operations to about 4,680,000 barrels daily, as compared with a forecast of 4,730,000 barrels a day for November.

The major cut will be in Texas, where the forecast is dropped from 2,090,000 to 2,050,000 barrels daily. The estimate for Oklahoma, reduced 1000 barrels in November, will be cut another 3000 barrels to 380,000 barrels daily, and lesser reductions are seen in several other states.

New Mexico Map

Possible stratigraphic traps for oil in west-central New Mexico are charted in a new map of Joyita Hills, Los Linos Mountains and northern Chupadera Mesa, Valencia, Torrance and Socorro counties, covering an area of about 1000 square miles, just published by the U. S. Geological Survey.

Copies of the map, Preliminary Map 61 of the Oil and Gas Investigations series, will be available December 5 at 65 cents each from the bureau's offices in Washington, Denver and Tulsa.

Consolidated Gas Line Hearing Gets Under Way

Hearing in newly organized Mid-Continent Gas Transmission Company's application to construct 836 miles of 26-inch natural gas transmission pipe line, at a cost of $89,460,000, started in Kansas City, Mo., November 25 before a Federal Power Commission examiner.

Also at the hearing are Cities Service Gas Company and Northern Natural Gas Company, both companies having asked authority to extend and expand their present facilities. The requests of all three firms have been consolidated and this hearing is expected to require several weeks. Cities Service and Northern Natural are objecting to Mid-Continent's proposal.

Mid-Continent is asking permission to construct a pipe line from Liberal, Kas., in the Hugoton gas field, through Kansas City to the vicinity of St. Paul, Minn. The company proposes to supply distributors in 83 communities in Missouri, Iowa, Minnesota and Wisconsin.

Jerome Hoffman, general counsel for Mid-Continent, testified that the firm plans to have the 400-mile pipe line span from Liberal to Kansas City, capable of moving 210 million cubic feet of natural gas daily, completed by the end of 1947. The 436-mile Kansas City-St. Paul span would be completed by January 1, 1949, Hoffman forecast. He said the inadequacy of present facilities is evidenced by the Cities Service and Northern Natural requests for extension of their pipe lines, and that many areas in Northwester Missouri, Eastern Iowa, Minnesota and Wisconsin are not now supplied with natural gas.

Glenn W. Clark, general counsel for Cities Service Gas Company, said he would file a motion to dismiss the Mid-Continent application to "invade" the Kansas City market after evidence had been heard. Lawrence I. Shaw, of Omaha, Neb., general counsel for Northern Natural, said the same situation existed in Omaha between his company and Mid-Continent.

Cities Service is seeking permission to construct a 26-inch 405-mile gas transmission line from the Hugoton field to Wichita and Kansas City at an estimated cost of $23 million. Northern Natural is asking authority to make extensive additions to its system in Texas, Oklahoma, Kansas, Nebraska, Iowa, Minnesota and South Dakota. The additions would cost nearly $13 million.

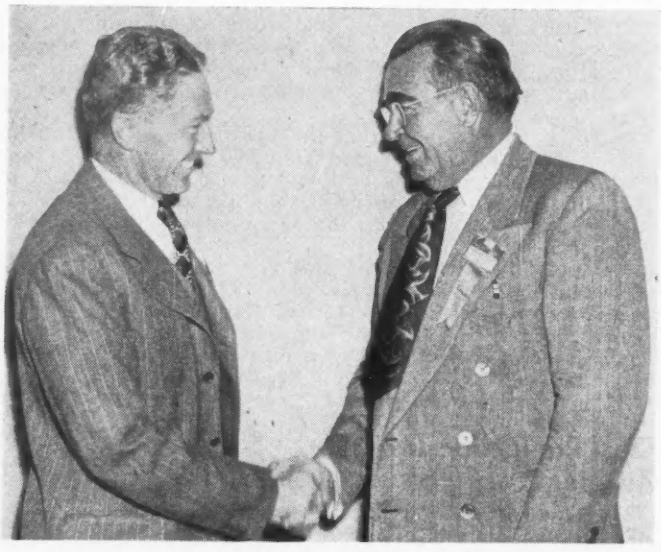
New Socony-Vacuum Line

The Socony-Vacuum Oil Company's 300-mile products pipe line project, extending from the Paulsboro, N. J., refinery to Midland, Pa., is scheduled for completion early in 1947.

With the use of temporary pumping equipment, products are now being shipped in limited quantities as far as Altoona. Main pumps are scheduled for installation about January 1 with the system in full operation a month later.

The line will carry gasoline, kerosine and light fuels. Outlet terminals are located at Malvern, Lancaster, Harrisburg, Mt. Union, Altoona, Cramer, Irwin and McKees Rocks, and Midland, Pennsylvania. The first 23 miles of the line are 12-inch, next 42 miles 10-inch, and the remainder 8-inch.

James Donoghue New Head of RMOGA



(Photo by Scott Boggess, Denver).

James Donoghue, left, MacKinnie Oil & Drilling Company, Denver, is the new president of the Rocky Mountain Oil & Gas Association succeeding Paul Stock, right, of Cody, Wyo. Other officers elected at the association's annual meeting in Denver are R. B. Curran, Billings, Montana, first vice president; Glenn Nielson, Cody, second vice president; Edward Holt, Salt Lake City, third vice president; and Fred M. Manning, Jr., Denver, treasurer. An executive secretary has not been named to replace H. O. English who has resigned.

A proposal that the association recommend conservation measures for Rocky Mountain States was postponed indefinitely when members were unable to agree on all points. The members adopted a resolution calling on the Federal Power Commission to relinquish all controls over the oil and gas industry.

Within the Rocky Mountain Region, Colorado is the only state having a conservation bill, and this is applicable to gas only. Wyoming legislatures have considered oil and gas conservation measures for the past eight years, but have not passed any legislation along this line.

In joint session with the Denver Geological Society, the Association heard Dr. William O. Hotchkiss, President Emeritus of Rensselaer Polytechnic Institute and president of the Society of Economic Geologists, who spoke on "Non-Fuel Minerals and National Defense." "Oil Economics and Americanism" was the topic of a talk by Captain A. A. Nichoson, assistant to the vice president of The Texas Company.

Several association problems will be handled through committees. Legislative proposals concerning oil industry taxation will be presented in several Rocky Mountain States during the coming year. This is particularly true in Colorado, where additional taxation is being considered for both crude oil and gasoline, and a major political issue has been taxation for the improvement of roads to the Rangely field in the northwestern section of the state. The public lands committee of the Association is still considering recommendations to the Department of the Interior concerning regulations recently issued for administration of Amendments to the Federal Leasing Act.

Pipe Line Tax Gains

Treasury revenues from the three oil taxes in October fell sharply below the corresponding month last year, acording to Internal Revenue Bureau figures.

Receipts from the gasoline tax were $39,237,189 against $43,813,359, while lubricating oil returned $6,040,338 against $7,001,490 and pipe-line transportation $1,566,212 against $1,414,796.

For the first ten months of the year, the revenue from gasoline was $339,399,-301 against $356,927,933 in the corresponding 1945 period, lubricating oil receipts were $59,195,506 against $86,308,-488, and the return from pipe line transportation was $12,448,951 against $12,-022,917.

FPC Is Asked to Approve Pennsylvania Line Project

Plans of Ohio Fuel Gas Company for a $3,370,100 expansion of its transmission system, including the conversion of the Wellington field, Lorain and Medina counties, Ohio, for storage, has been given a green light by the Federal Power Commission. Conversion is to start next spring.

An application has been filed by New York state Natural Gas Corporation for authority to construct 70 miles of 12¾-inch and 50 miles of 14-inch loop line and 14 miles of 16-inch transmission line in Pennsylvania to handle 90,000 Mcf daily of gas to be obtained from Hope Natural Gas Company under a recent contract, to be followed in 1948 by construction of 31 miles of additional loop line. Cost of the project is estimated at $5,250,000.

Shell Forced to Curtail Purchases in West Texas

Shell Oil Company has curtailed its production and purchases in four West Texas multi-pay, sweet oil areas, served exclusively by Shell Pipe Line Corporation, to 72 percent of the allowable set by the Railroad Commission for November. This move became necessary through the allowables exceeding the company's transportation facilities and applies to the Bedford, Wheeler, TXL and Monahans fields.

The calendar-day allowable of these fields was boosted from 19,200 barrels as of October 1 to 32,500 barrels on November 1. Prior to taking this action, Don Crites, manager of Texas crude purchases for Shell, notified the commission at a special hearing that a cut of 9595 barrels was needed to balance receipts with pipe line outlet. He stated that Shell is connected to 41,625 barrels daily allowable that is in excess of its two trunk line outlets for West Texas, but 23,100 barrels of the surplus is delivered to connecting lines locally, while spot sales amount to an additional 8000 barrels daily. He added that the company has filled all available storage.

Attorney General Clark At Dallas Compact Meet

Tom C. Clark, United States Attorney General, will discuss various aspects of petroleum in the national economy at the Interstate Oil Compact Commission's quarterly meeting in Dallas, December 9-11. Technical speakers on the program are Don R. Knowlton, Oklahoma City consulting engineer, and Jack K. Baumel, chief engineer, Texas Railroad Commission. Reservoir control is the topic chosen for the Dallas meeting.

The compact's Economics Advisory Committee will meet on December 6 to prepare its report. Other committees will meet on December 9, with joint committee meeting and roundtable slated for the afternoon of the opening day of the parley.

Open forum on December 10 will provide an opportunity for discussion of any subject deemed pertinent to conservation and probably will include public relations, conservation payments and the Anglo-American oil agreement.

Bids on Montana Land Reported as Numerous

The Interior Department has received 83 bids on 53 parcels of potential oil lands in the Bowdoin field, Montana. The total cash offered by all bidders was $90,179 and the individual bonuses offered ranged from $2 to $6 an acre.

The offering, the largest ever made by the department for oil leases, consisted of 20,127 acres, with no restrictions on the number of parcels which might be leased by a single interest.

Levorsen Heads School

Dean of a new School of Mineral Sciences at Stanford University, combining what were formerly the Departments of Geology and Mining, will be Professor A. Irving Levorsen, who has been head of the Department of Geology. Activities of the new school will start January 1.

Co-ops Would Produce Half of Oil Called for By Own Refining Plants

Cooperative associations are facing tax fights in Kansas and other states, Howard A. Cowden, president of the Consumers Cooperative Association, told delegates to the association's meeting in Kansas City.

The Kansas legislature will be asked to amend the cooperative laws so as to place additional restrictions on co-ops, Cowden said.

Cooperative tankers carrying gasoline and oil from cooperative-owned oil fields soon will be sailing around the world, Cowden declared in his report on the formation of an international association. He said that headquarters of the new world oil cooperative probably will be in New York with a branch in London.

The Cooperative Refinery Association, a subsidiary of the Consumers Cooperative Association, has increased its holdings from 368 to 448 producing wells in Illinois, Kansas, Oklahoma and Texas, Cowden reported.

Cowden said the wells produced 1,641,676 barrels or 31 percent of the 5,345,385 barrels of crude oil used by the association's three refineries at Coffeyville and Phillipsburg, Kas., and Scotts Bluff, Neb., in 1944-45.

The association supplied about 200 million gallons of refined fuels; 19,687,377 gallons of lubricating oil and 4,758,770 pounds of grease to its members and other coops in the United States and abroad, Cowden said.

An increase in the control and ownership of oil wells sufficient to supply 50 percent of the crude required for coop refineries is one of the goals of the association.

An expansion program calling for the expenditure of $30 million in the next five years was adopted at the association's final session.

Officials said that a large but undetermined part of the sum would be spent in the association's effort to produce more oil for its refineries.

The delegates adopted a resolution favoring placing Middle East oil under a proration commission of the United States.

Cement Supply Continues A Problem in Oil Fields

Although the problem of obtaining cement in Louisiana oil fields continues serious, the shortage has been somewhat alleviated in the Permian Basin of West Texas.

B. C. Scott, of the Halliburton Oil Well Cementing Company of Duncan, Okla., said last week that due to current weather conditions in practically all of northern Kansas and Colorado, his company was able to "pull away" sufficient cement from those areas, in order to rush a supply to the fields. Three big cement plants have been on strike for several weeks.

Approximately 70 carloads of cement have been sent into the West Texas area within the past week—a supply which Scott termed "ample," at least for the present. He pointed out, however, that if weather conditions in Kansas and Colorado improve so that construction work can be carried on normally he will be unable to obtain a great amount of cement from that area for the Permian Basin.

The situation in the Permian Basin as well as in Louisiana fields since three big cement plants were closed by a workers' strike, has been so serious that wells were left circulating for several days while crews waited for cement. In some instances crews carried sacks of cement by hand from local communities in order to set pipe strings.

Mid-Continent Tax Meet Speaker Slate Announced

Speakers have been announced for the annual Advalorem Tax Forum of the Mid-Continent Oil & Gas Association, in San Antonio, December 16-18. The agenda includes subjects of general interest to those engaged in the state and local tax fields.

Among the speakers who will address the forum are:

R. J. Boyle, attorney, San Antonio; Charles C. Zatarain, member of the Louisiana Tax Commission, Baton Rouge; Arthur L. Maberry, executive director, Texas School Districts Cooperative Association, Austin; George W. Mitchell, economist, Federal Reserve Bank of Chicago; John M. Campbell, executive secretary, New Mexico Oil & Gas Association, Roswell; W. C. Morris, independent operator, San Antonio; E. L. Maynard, supervisor, property tax division, Illinois Department of Revenue, Chicago.

Berry Brown, tax consultant, North Texas Oil & Gas Association, Wichita Falls; W. H. Wallace, valuation engineer, Mississippi Tax Commission, Jackson; Gerald Gordon, executive secretary, Associated Industries of Kansas, Topeka; J. R. Robertson, chief engineer, Indiana State Board of Tax Commissions, Indianapolis; Robert Burns and John C. Satterfield, attorneys, Jackson, Miss., and F. H. Guild, director, research division, Kansas Legislative Council, Topeka.

Oil Pioneers Plans

The Petroleum Production Pioneers of California will hold their annual year-end party in Los Angeles on December 13. The oldtimers will convene at 5 o'clock and spend the evening feasting and reminiscing. Although the organization already has approximately 500 members, a drive to enlarge the group will soon be launched, President J. E. Gosline of Standard Oil Company of California has announced.

API Chapter Elects

The San Joaquin Valley Chapter of API has elected K. E. Grigsby of Norwalk Company chairman for the coming year. Other new officers are: T. H. Wallace, Western Gulf Oil Company, first vice chairman; D. G. Kingman, General Petroleum Corporation, second vice chairman; and P. H. Craner, Standard Oil Company of California, secretary.

Photogeology

AIDS OIL EXPLORATION

By LAURENCE BRUNDALL, Vice President, Geophoto Services, Inc., Denver

A NEW science looms on the horizon of the petroleum industry. Photogeology, although originated before the war, has finally arrived as a tried and true method of exploration. Several factors have contributed to the current interest in photogeological exploration. One is the great increase in crude demand and the decreasing rate of new field discovery. Another is based on the important role of photographic interpretation in the war and the peacetime applications of these war-perfected techniques.

The relationship of petroleum exploration to the discovery of new oil fields is directly affected by the inception of new or refined exploratory techniques. This is a subject which has concerned many engaged in petroleum exploration. In the Symposium on Petroleum Discovery Methods issued by the American Association of Petroleum Geologists much emphasis was placed on the fact that surface mapping should not be regarded as an exploratory "has been" but that refined surface mapping techniques combined with an appreciation of geomorphology give promise of pointing the way to new reserves.

Photogeology as an improved and speedy method of reconnaissance surface mapping can no longer be regarded as some new-fangled, "long-haired" research project. It is already being suc-

Courtesy Fairchild Aerial Surveys, Inc., Los Angeles

"This field was not discovered directly by means of aerial photography but its striking appearance from the air led to a detailed topographic survey, which outlined the structure and resulted in the drilling of the discovery well."[9] There are no outcrops on the structure but the outline of the slight topographic high which marks the field has been accentuated by recurrent flooding of the flat alluvial plain at which times the higher ground was an island. The white band around the structure marks the highest advances of the flood waters.

cessfully used in many areas in the United States and foreign countries.

The purpose of this paper is to review the latest advances in aerial photography and photogeological techniques and to illustrate how these factors are being applied to modern petroleum exploration.

World War I Use

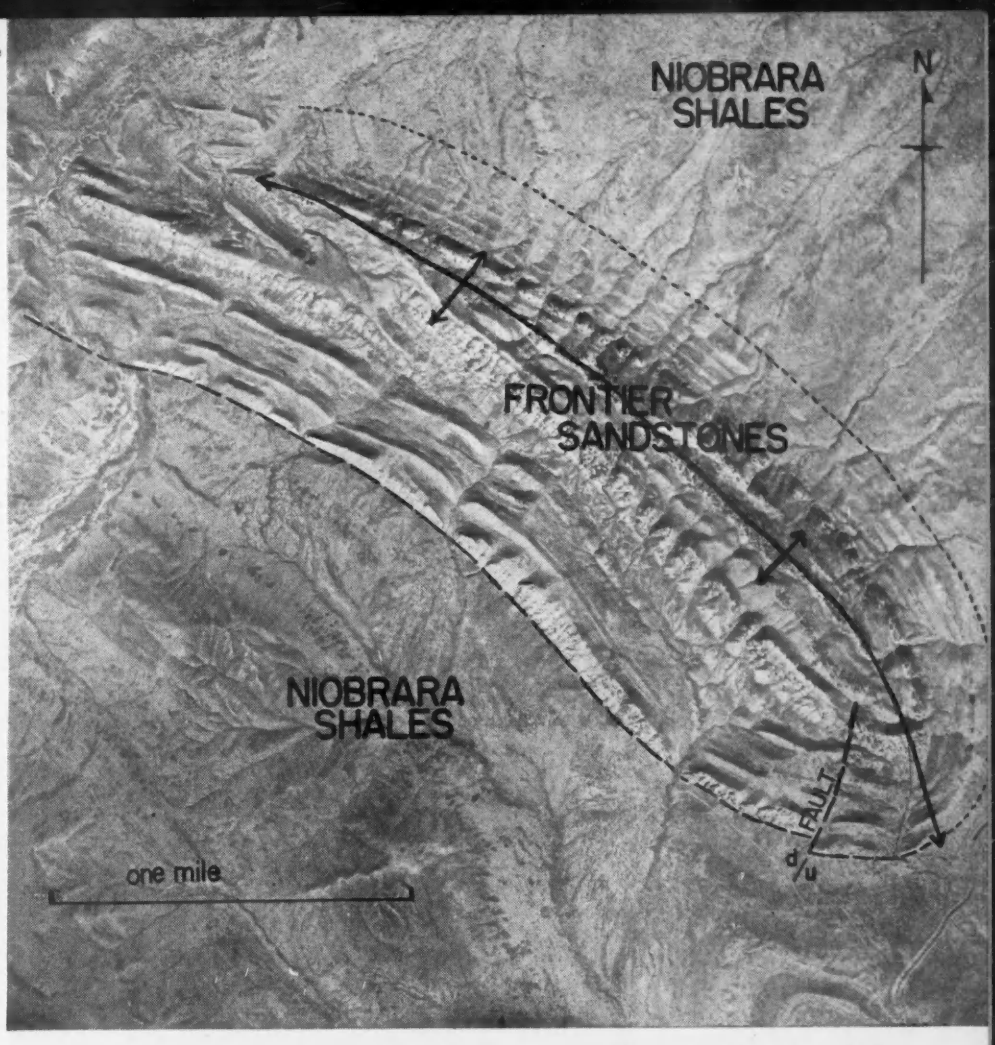
One of the first instances of the use of photogeology dates from World War I when Col. A. H. Brooks, chief geologist to the AEF, mapped geological formations in enemy territory by means of aerial photographs.[1] In the 1920's many geologists used aerial photographic mosaics as base maps in the field. Although this procedure could not be truly rated as photogeological exploration, the time saved in location of outcrops and in knowing in advance where to go to find outcrops was of great value. Perhaps the first example of true photogeologic mapping in the U. S. was done on aerial photographs of the Elk Hills field, California, in connection with a lawsuit.

During the ten years prior to World War II, photo mosaics were in greater use and it was in this period that several major companies set up photogeological units in their exploration departments. In those days the science was still earthbound in that stereoscopic examination of contact prints was done by field geologists concurrently with their field mapping programs. Except in one or two instances the specialized photogeologist of today has not arrived.

In World War II many petroleum geologists who had worked with aerial photographs were taken into the armed forced as photographic intelligence officers. Other geologists who had no previous experience with aerial photographs were accepted because it was known that a geological education was an excellent background for combat photo intelligence work. The geologist's appreciation of terrain, his knowledge of maps, and his attention to detail when applied to searching out hidden gun batteries or the conditions of an enemy landing beach rendered him admirably efficient in photo intelligence.

Photogeology should be regarded as a potent tool in the hands of the exploration geologist. Like any tool it is not the end result but an important aid. To carry the analogy further, there are other phases of petroleum exploration which can be done better by the tools of geophysics or core drilling or subsurface studies as the case may be. Photogeology fills the need for a rapid and comparatively inexpensive technique with which large areas can be evaluated. The smaller blocks which show surface evidence of favorable structural anomalies can then be evaluated in further detail, if necessary, by one of the other accepted exploration tools. In this way expensive geophysical or detailed surface mapping of many large areas can be eliminated. There are other factors which render photogeology the ideal approach for preliminary exploration. In working rough terrain, accessibility of the area is not important, whereas the speed of conventional surface mapping is directly influenced by the roughness of the country.

Adverse weather is another detrimental factor to surface mapping which has no effect on the speed of photogeologic studies once the photographs have been obtained. An ideal setup for high latitude areas is to do the photogeologic work during the winter months when the area is probably snow covered. Favorable anomalies can be given a field check in the spring and the most promising areas can be blocked before competitors have an opportunity to do any surface work in the region.



Structures as obvious as this one in central Wyoming are spectacular on aerial photographs but most of them have been known for years. The above structure was discovered in 1917. It is an asymmetrical fold with the steepest flank on the northeast. Units of the Frontier sandstone formation (Cretaceous) are surrounded by younger shales of the Niobrara formation. The small black specks in the center of the structure are dwarf pine trees which are characteristic of the Frontier sandstones in Wyoming and Montana.

Courtesy Aero Exploration Company, Tulsa

Secrecy of Operation

In the highly competitive oil industry secrecy of exploration activities is very desirable. Photogeology is the only reconnaissance evaluation method by which it is possible to attain proper secrecy of operation. Photographs can be worked many miles from the area which is to be evaluated and quick field checks can be made without throwing suspicion on the play.

The expert photogeologist is a scientist who is not only an able field geologist and structural geologist but who is thoroughly versed in the related study of geomorphology and he must also know the fundamentals of vegetation ecology and soil distribution. For it is the recognition and interpretation of all the minutiae exhibited by the tones and stereoscopic relief of an aerial photograph which enables the photogeologist to translate these observations into the important criteria necessary for an accurate surface geological evaluation of an area.

Visual reconnaissance from an airplane vs. stereoscopic examination of aerial photographs is an oft-argued point. Both methods have their advantages but the writer from his war-time experiences in both methods prefers aerial photo examination. The chief disadvantage of visual observation is that the field of view is never constant enough to afford a detailed observation of any one area and the human eye cannot retain the mass of detail which can be recorded on an aerial photograph. The practical development of the helicopter may see the day when the photogeologist will supplement his aerial photo studies from a hovering plane. Another disadvantage is that visual observation cannot afford the photogrammetric measurements essential in detailed photogeologic evaluation. Also, it is well known that at an altitude high enough to afford a sufficiently wide visual field the terrain appears flat except in very rugged areas. The relief model as seen through a magnifying stereoscope is exaggerated in the vertical component. This is a decided advantage in a qualitative evaluation of the dips and strikes of the outcrops of an area.

The air view, whether it be by visual observation or by photoexamination, truly gives the normally earthbound geologist an entirely new slant and appreciation of his profession. Unlike the bear who laboriously climbs the hill to see what is on the other side the photogeologist can see both sides at once. He can easily bridge canyons and high ridges and carry his correlations along while the same work on the ground

would require much more time and effort. In areas of scattered outcrops it would be necessary for the ground geologist to traverse every acre in order to be certain that no diagnostic exposures were omitted. When such areas amount to several hundred square miles, this becomes a major project of walking ridges and valleys. The photogeologist can spot all the outcrops in such an area in a matter of a few hours, unless they are covered by dense vegetation, and if his photo studies did nothing more than indicate where the geologist should go in the field to find those outcrops, the work would be more than justified.

But photogeology carries the evaluation of an area much further. In many cases it is actually easier to correlate units on photos than on the ground. Dr. W. G. Woolnough, chief geologist to the Australian government,[3] cites a case in the sandstone outcrops of Western Australia where cross bedding and lenticularity observed at close quarters on the ground made dip and strike readings extremely difficult. The aerial view eliminated these irregularities to a large degree and indicated the presence of very large lithological features, the existence of which could be determined at close quarters only by time-consuming and expensive detailed surveying.

The expert photogeologist is able to pick up details of bedding and structure which are difficult or impossible to note on the ground. An example of this is seen on the Elk Basin structure on the Montana-Wyoming line. Steeply dipping Upper Cretaceous and Eocene rocks on the southeast flank of the structure are obscured by a high gravel bench. On the ground individual units cannot be traced beneath this bench, but they can be clearly delineated on aerial photographs of the area.

L. T. Eliel[5] of the Fairchild Corporation cites a case in California where a portion of an anticline was quite evident on the ground, but where the hills gave way to a flat uncultivated valley all evidence of bedding was lost to the ground observer. On aerial photos bedding was traced four miles into the flat valley and the anticlinal axis was projected the same distance.

C. R. Robbins[4] of the Aircraft Operating Company, Ltd., of South Africa, has noted that one of the greatest values of geological information from aerial photos lies in the recognition of features which are not visible or appreciated on the ground. He mentions that faulting can be discovered although buried by thousands of feet of younger, post-fault rocks; and that dikes and fractures completely covered by bush and many feet of overburden can still be discovered.

During the war the photographic interpretation of underwater phenomena was advanced to a very high degree. Thousands of American lives and millions of dollars worth of equipment were saved through offshore beach studies in which the depth of the water was determined from aerial photographs and accurate evaluation of the bottom conditions was made. Kodacolor reversal film proved valuable in underwater photo analysis. The same techniques should be successful in photogeological mapping along many of the nearshore areas of the world adjacent to prospective or proven petroliferous provinces. H. C. Rea[8] has noted that the Elwood anticline off the Santa Barbara, Calif., coast is delineated by kelp adhering to submarine outcrops of Monterrey shale.

Method of Attack

Determination of dips and strikes on aerial photographs is one of the most important functions in photogeological evaluation.

In areas where the ground surface is fairly flat and the dips greater than five or six degrees the direction of the outcrop band will be the strike of the beds. The steeper the angle of dip, the less the outcrop band will deviate because of topographic differences. A good example of this is in the steeply dipping pre-Tertiary hogbacks of the Rocky Mountain region.

For very flat beds the dip and strike are quite difficult to estimate by eye. In dissected topography the strike of the beds can be obtained by measuring the direction of two points of equal elevation on the same contact on opposite sides of a valley or opposite sides of a hill. Elevations can be estimated under the stereoscope but a more accurate method is to use a photogrammetric instrument.

While the direction of dip usually can be determined by visual observation except on very gently dipping beds, the accurate estimation of the true angle of dip by stereoscopic means is subject to exaggerations in relief and distortions of the stereoscopic model. The tendency is to estimate a much steeper dip than the beds actually have. Several methods have been evolved for the determination of dip angles on aerial photographs. One is a utilization of the well-known three-point method; the elevations of the dipping surface at each point being determined by photogrammetric means. Another process is suggested by Desjardins.[6]

As on the ground, the more outcrops which can be traced on aerial photographs the more complete the evalua-

The left hand photograph is a mosaic of a portion of Moffat and Rio Blanco counties, Colorado. The highly dissected topography of the area and the vegetation cover have rendered an accurate photogeological evaluation almost impossible on the mosaic. The right hand photograph is a portion of a nine by nine inch contact print and its coverage is marked on the mosaic. Stereoscopic examination of the contact prints affords a wealth of detail which cannot be seen on the mosaic. This photograph shows the western end of the Wilson Creek oil field of Rio Blanco County which is one of the topographically highest producing structures in the United States. The average elevation of the field is 8000 feet above sea level.

U. S. Dept. Agriculture Photographs

tion of the area will be. In some areas the outcrop pattern is restricted and instead of being able to trace units over considerable distances the photogeologist must rely on dip and strike determination on a number of scattered exposures to build up his structural conception of the area. This is particularly true of many of the Tertiary basins of the Rocky Mountain area. These basins are perfect examples of the efficiency of photogeological evaluation studies. Very little surface mapping has been undertaken there because of the scarcity of outcrops and the difficulties in accessibility. Aerial photographic analysis has been responsible for accurate and speedy evaluation of large Tertiary areas which would normally require one or more complete field seasons to accomplish on the ground.

In cases where a sedimentary sequence is obvious or where it can be built up through the identification of surface features directly influenced by bedding such as breaks in slope, vegetation bands and soil texture, a stratigraphic section can be arrived at which will be the basis for constructing a structural contour map of the area.

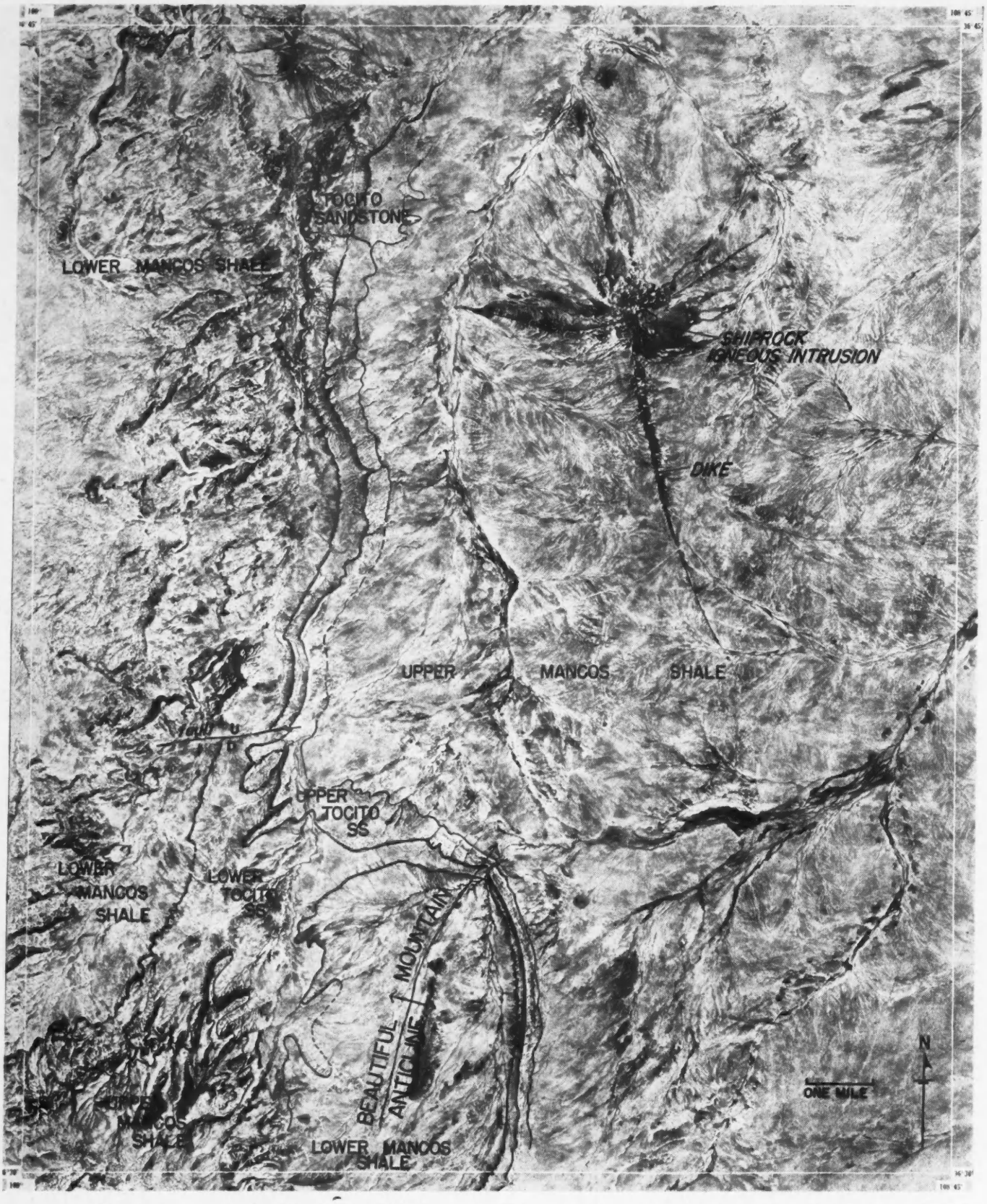
After long experience in aerial photo analysis, the expert photogeologist can actually identify lithologic units such as shales, sandstones, lava, granite, etc. Characteristics of weathering, topographic expression and associated vegetation are all clues toward the identification of rock types. These characteristics will vary from area to area and between formations composed of the same rock type, but when a photogeologist becomes familiar with a specific area he can use a system of "key textures" to aid him in correlating and tracing beds.

The above statement may be an oversimplification and there are many pitfalls of which the photogeologist must be aware in order to arrive at an accurate evaluation of an area. The idea of using vegetation to identify formational contacts or units within a formation is not as simple as it sounds. The Reklaw-Carrizo contact in South Texas is often pointed to as an example of this. In that area the Carrizo sand provides a natural habitat for blackjack growth and the more argillaceous Reklaw is favored by mesquite shrubs. On aerial photographs the line of demarcation between the two vegetative types is quite distinct but not always does this line mark the actual formational boundary since the unconsolidated Carrizo sand, containing blackjack growth, is often washed over the Reklaw. Then again, the type of vegetation growing on the same formation will be dependent on such factors as rainfall, altitude, and the local character of the formation. The photogeologist must be cognizant of these factors in order to arrive at a correct answer.

Differences in vegetation are often good indications of faults or dikes. Even in some jungle country it is surprising that vegetation can be used to get an idea of structural irregularities.

Levings[7] mentions a personal communication from K. C. Heald in which the latter says: "Sometimes changes in vegetation or soil color, which would be unnoticed by geologists on the ground, show up in a very striking way on the airplane photographs." Heald states that the first well on the Santa Rosa structure of eastern Venezuela was located on seismograph work and it proved to be a dry hole. Study of aerial photos showed an "egg-shaped patch about two miles from the location of this first well where the tone of the photograph was distinctly lighter than the surrounding area. Investigation proved that this light spot was the top of the Santa Rosa dome."

Dr. Woolnough,[8] who is one of the first geologists to realize the potentialities of photogeology, cites an interesting example of soil differentiation in Queensland, Australia, which could only be seen on aerial photographs. Months



There are still extensive areas in the United States which have not been fully mapped on the surface. One of these areas is the San Juan basin of northwestern New Mexico. The above mosaic of the Ship Rock area in this basin shows an example of the surface geology of the region. Ship Rock is an igneous plug with spectacular radiating dikes. The Beautiful Mountain anticline is a long, relatively narrow fold, the northern portion of which is shown on the mosaic. The maximum closure on the structure is about 150 feet. A well drilled in 1925 to the Dakota had a fair show of oil at 1727 feet but no commercial production was obtained. Courtesy of Fairchild Aerial Surveys, Inc., Los Angeles, Calif.

of detailed surface investigations in this area failed to disclose any reliable geological information. An aerial survey of the locality indicated a conspicuous symmetrical soil pattern which was evidently a reflection of sub-surface geological structure in deeply decomposed sedimentary rocks. The marked soil differences could not be traced on the ground at first and it was only after extremely detailed comparison of features on the photographs and on the ground that a slight variation in soil texture could be seen. This variation was noticeable on the ground only where sheep had kicked up the soil.

Since the aim of commercial photogeology is to gain an understanding of

the structural conditions of an area, the types of maps which can be prepared to present this information are of prime importance.

Base maps of areas in the U. S. usually can be prepared from existing ground information such as township plats, government topographic maps, or other survey maps. In certain oil-producing or prospective oil-producing areas excellent controlled base maps prepared from aerial photographs are available from commercial sources. However, the areas which are being assigned for photogeological work today are usually devoid of accurate maps and the photogeologist must prepare his own. After the base outline has been prepared from the sources mentioned above, ground control points whose position can be found both on the photographs and on the survey maps are plotted on the base. It is desirable to have three points at each end of a flight line and several other points along each flight line for extra control. The scales of the various flights are then adjusted to fit the master scale and the geological and geographical data are transposed from the photos to the base map by means of the radial line plot method. An instrument known as a Sketchmaster is a time-saving aid in transposing the details from aerial photographs to a map sheet, provision being made for scale adjustment and correction of distortions due to tilt of the photographs. (See Figure 1). A semi-transparent mirror located directly beneath the operator's eye performs the optical phenomenon of causing the image of the photograph to appear to lie on the surface of the map to which it is being transferred. It should be emphasized that this method is only as accurate as the existing ground control, but for purposes of photogeological presentation where speed and cost are very important the extra expense of sending survey parties to the area to obtain additional ground control cannot be justified.

Today an area is usually assigned for photogeological evaluation for one of two reasons. Most of the areas in proven petroliferous territory which contain well defined outcrops have already been worked to some degree on the ground. If the area which is to be evaluated by photogeologic means does contain well-defined outcrops, it is either too remote and inaccessible for economic ground investigation or it is situated in a region which has not been productive of oil. In many cases both conditions will be present. Areas which contain relatively few outcrops may or may not be remote, but the time and cost involved to cover these areas in sufficient detail on the ground in order to get an accurate idea of the structural conditions will be greater than by photogeological evaluation.

It is true that the most obvious areas for surface mapping have been covered already on the ground. The amount of detailed work and experience necessary for accurate photogeological evaluation of today's areas is therefore greater because of this fact. All the well-known pre-Tertiary "textbook" structures of Wyoming and Montana could have been discovered in a fraction of the time actually necessary for their mapping had photogeology been in vogue in the early 1920's. The same applies to many salt domes on the Gulf Coast and to structures in California, the Eastern producing states and the Mid-Continent.

Figure 1. The Vertical Sketchmaster in operation. The aerial photograph in use is placed under the inclined mirror and corrections for tip and tilt and change of scale are made by adjusting the instrument on its three legs. The operator then traces the detail of the photograph on the base map of the area

Courtesy of Aero Service Corporation, Philadelphia

In areas where outcrops are not common and the exposed rocks lack diagnostic characteristics which prevent correlations between outcrops, a structural interpretation map is relied upon to give a picture of the area. This type of map is based on the information afforded by as many dip and strike readings which can be obtained from the photographs. Areas of moderate to steep dips usually have a continuity of outcrops from which a stratigraphic section can be constructed, but in those areas in which the outcrops are poor the dips are usually low and structural anomalies are not at all obvious. A stereoscopic height-finding instrument is used to obtain measured dips and strikes and these readings are supplemented by dips and strikes obtained by visual observation through the stereoscope. Any other photogeological clues to the structure of the area such as vegetative differences, possible dip slopes, suspicious banding beneath gravel benches or other alluvial deposits, and physiographic indications of faults or anticlinal anomalies are also indicated on a structural interpretation map. The Tertiary basins of the Rocky Mountain region are examples of areas in which this type of map is used.

Structural Contour Map

The other type of map which it is possible to construct through photogeological studies is the conventional structural contour map. This can be done in those areas having sufficient outcrops which can be built up into stratigraphic section. After the section has been established, elevations are obtained on key horizons either by reference to available topographic contour maps of the area or by photogrammetric means from the photographs. In the latter case it is necessary to establish a sufficient number of ground elevation control points by altimeter or plane table traverses.

The writer and his associates wish to emphasize that field checks are necessary corollaries to photogeologic evaluations except in preliminary reconnaissance studies of remote areas where it is only desired to ascertain if there are indications of structural anomalies. Field checks are for the purpose of investigating the less obvious indications of structures and to look for small critical exposures which may be obscured on the photographs by overhanging ledges or by heavily wooded areas. Also, in some areas where the lithologic units are not distinct, the prevailing scale now in use (1/20,000) does not allow accurate determination of dip and strike. It is therefore necessary to supplement the photogeologic work with field measured dips and strikes. However, study of the photographs will still be of great value in that the geologist will have prior knowledge of where to go in the field.

The outlook for photogeology is brighter today than any other time in the history of petroleum exploration. The need for expert photogeologists is increasing, but only long experience with aerial photographs coupled with a flair for detailed observation and the ability to realize the significance of the subtle clues contained in the varying tones of a photographic print will enable a geologist to produce accurate work. Excellent eyesight is also a most important attribute of the photogeologist, since long hours must be spent in looking through a stereoscope.

Photogeology in its correct niche as a valuable adjunct to petroleum exploration will enable the oil operator to select smaller portions of large tracts for detailed evaluation by other methods. The time and money saved by this system have already more than justified the acceptance of photogeology as a standard operating procedure.

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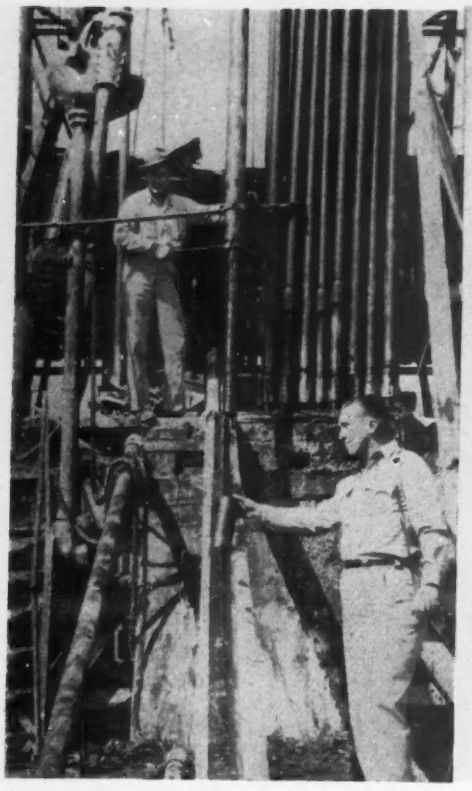

Figure 1 (left). Typical Weber sand cores upon removal from the diamond core barrel. Special tool holds core as portions are broken out and laid down.

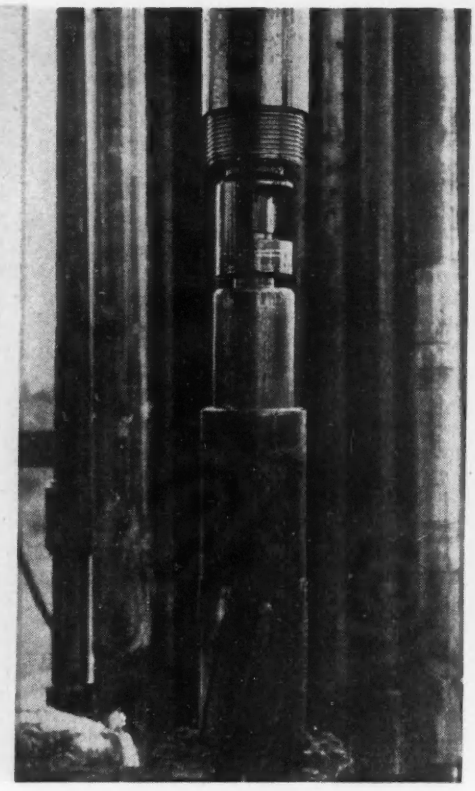

Figure 2 (right). Inner core barrel partially removed, showing free-floating ball bearing race. Slanting lugs on outer barrel used as stabilizer.

Diamond Core Bits

GIVE HIGH RECOVERY

By GILBERT M. WILSON
Staff Writer

A NEW type core barrel employing an improved diamond bit cutting head has been instrumental in bringing about more economical and greatly improved coring conditions in wells being drilled by Stanolind Oil & Gas Company in Rangely field, Colorado.

The diamond bit, placed on the bottom of a 25-foot core barrel, cuts a 6⅛-inch hole and 3¾-inch core. One hundred percent core recovery has not been uncommon, with 25-foot solid Weber sand cores frequently being taken from the barrel. Figure 1 illustrates the typical appearance of these cores as they are broken out of the barrel at the surface.

The new core barrel, employed previously in some West Texas and Indiana oil fields, was first used experimentally at Rangely about September 1 on Stanolind's Hefley 1, SW NW NW 2-1n-102w, located in the southeast part of the field. In this well core recovery was 100 percent, the average cut per bit being 88 feet, and with coring time averaging 9.6 minutes per foot. In comparison, a conventional core barrel used in a similar section of the hard sandstone in this well, cored at the rate of about 43 minutes per foot.

Complete and largely unbroken core recovery is attributable to both the design of the diamond core head and to the construction of the barrel, the latter actually consisting of two barrels, one inside the other. The inner barrel, which takes the core, is stationary, while the outer one, to which the diamond core head is attached, is rotated by the drill pipe. A free-floating ball bearing race between the top of the inner barrel and outer barrel (Figure 2) allows the inner barrel to remain stationary as the core slides into it. The circulating fluid flows around the inner barrel and through water courses in the bit, thus minimizing core flushing. After filling the inner barrel, the bit is pulled off bottom, allowing the split ring core catcher (Figure 3) to pull down in a tapered sub above the bit. This action breaks off the core, the latter then being held in the inner barrel for removal to the surface.

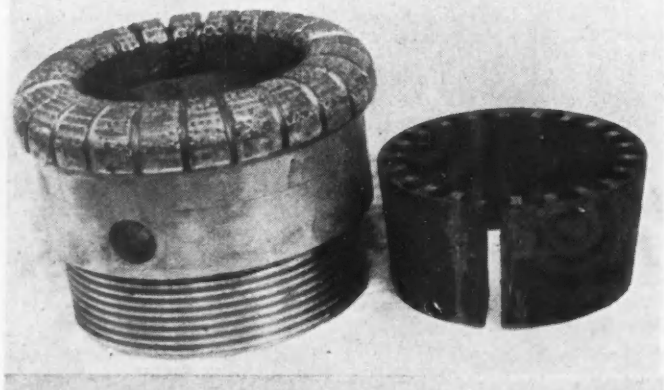

Figure 3. At left is a diamond core head which had made 125 feet of hole. Beside bit is the tapered, split-ring core catcher which is placed just inside the bottom of core barrel.

With the exception of the core barrel and the several special tools and wrenches used in handling it while it is out of the hole, all coring operations are conventional. Drilling mud is the same

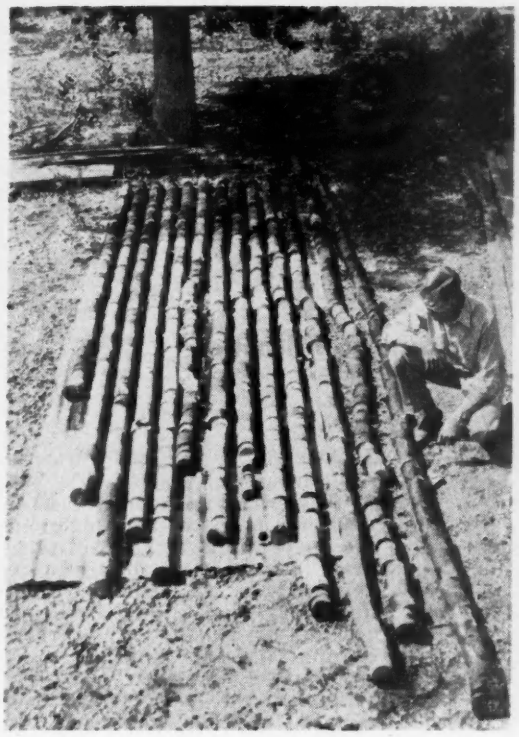

Figure 4 (left). View showing 393 feet of 3¾-inch cores representing 100 percent recovery with the diamond core barrel. Cores have been broken for easier removal from barrel as well as for inspection by geologist. Note alternately saturated intervals, typical of Weber sand.

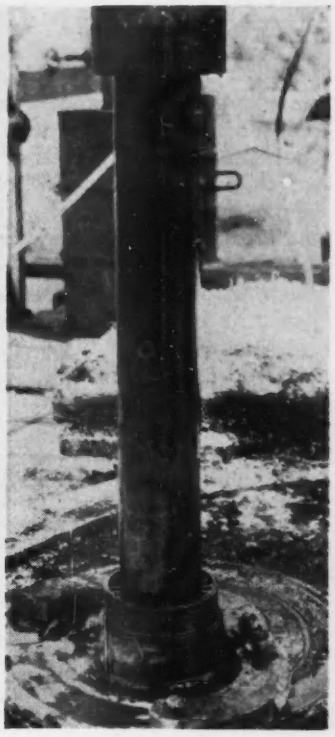

Figure 5 (right). With diamond core bit and core catcher removed, the core barrel is pulled up, exposing the core as it is cut from the formation.

as that used in coring with conventional barrels. In Hefley 1, 6⅛-inch hole was drilled in the sand, using 3½-inch drill pipe with three drill collars on bottom. The conventional core bit carries 6000 pounds weight at 40 revolutions per minute, while the diamond core bit carries 2000 pounds at 120 revolutions per minute.

Drilling and coring conditions in the Rangely field are difficult and costly at best, and the productive interval of the Weber sandstone of Pennsylvanian age topped at depths averaging from 6000 to 6300 feet is no exception. Oil is found in alternately saturated streaks of sand (Figure 4), the latter being a hard, fine-grained material of varying porosity and permeability and which generally contains a secondary cementation of calcite and silica. Some sandy and limey shales also are encountered in the interval. Completion practices to date usually call for the taking in of some 500 to 600 feet of this alternately saturated zone, the hole being left barefoot below the shoe of the seven-inch water string. Few wells in the field have cored the entire productive interval due to prohibitively high costs involved. The average contractor's charge of $650 per day runs coring costs alone up to from $30,000 to $40,000 per well, since 40 to 50 days usually have been required in coring the interval with conventional coring equipment. With the advent of more economical coring, such as appears possible with the diamond core barrel, it is believed that more of the productive formation will be cored for completion and correlation purposes.

Coring Costs Analyzed

While the new core barrel has to date been employed in several wells in the Rangely field, the information secured from one of its first coring jobs in the Weber sand is fairly representative of the results thus far obtained with the tool. These data, shown in Table 1, illustrate the degree to which savings may be realized. Core recoveries of 100 percent, with average cut per bit of from 88 to a maximum of 125 feet at cutting rates slightly under 10 minutes per foot, may be instrumental in considerably reducing the high drilling costs encountered in this field. Shortening the time hitherto required for coring also will result in lessening the danger of mudding off the productive interval, which, on the average, has a low porosity and permeability. Use of oil base mud while drilling-in on many of the Weber sand completions to date already has contributed much toward minimizing the mudding-off problem.

Recovery of single 25-foot long sandstone cores is common. Such cores assure positive identification and correlation of the many saturated streaks and sedimentary gradations throughout the entire sand section. Figure 4 shows typical core recoveries laid out beside the well, and which have been broken up by the geologist in order to obtain samples and cuts. The alternating intervals of saturation in the sand are easily visible in some of the core sections. At the end of the coring run, when the barrel becomes filled, it frequently requires up to 6000 pounds strain on the drill pipe to break off the core at the bit.

TABLE 1

Comparative Coring Data on Hefley 1

	Diamond Head 6⅛" O.D. 3¾" Core	Conventional Core Barrel and Bits
Weber formation cored—feet	353	119
Recovery—Feet	353	97
Recovery—Percent	100	80.8
Number of Cores Cut	15	19
Average Length per Cut—Feet	23.5	6.26
Total Cutting Time—Hours	56.13	84.93
Coring Time per Foot—Minutes	9.6	42.9
Number of Core Bits Used	6*	19
No of Bits Used Reaming and Drilling	7†	5
Average Cut per Bit—Feet	88	6.25
Maximum Cut per Bit—Feet	125.0	14.0

* Two Diamond Heads lost before cutting any core.
† Conventional Bits.

Diamonds Salvageable

The diamond bits admittedly are expensive, averaging about $1500 each, with costs depending at least partly upon the usually fluctuating diamond market. With reasonable care in handling, however, the per-foot cost of running the bit is held to a minimum. In addition, the worn diamond chips may be salvaged, still further reducing the cost. From 150 to 190 carats are required to face one bit, the diamonds being set in a bronze alloy material. The diamond bit shown in Figure 3 shows its appearance after having cut 125 feet of core. The bronze alloy matrix, while grooved, still holds the diamonds in cutting position and the bit is considered to be still in good condition for additional service.

Several changes and some new development work has been done on the new coring tool. Among the latter developments now underway is one in which the diamond core heads are used on a pressure core barrel which permits the taking of cores at original formation pressure. Another project being experimented with is that of coring with reversed circulation. In this process, drilling fluid is circulated down through the casing and up through the drill string. As the cores break off, they are washed to the surface by the circulating fluid. In the reverse circulation process, however, 2½-inch cores are taken instead of the 3¾-inch cores that have been taken by the diamond bit and barrel described above.

There remains little doubt that the preliminary success of this diamond bit core barrel has provided a means of further reducing well drilling costs, not only in the Rangely field, but in other areas as well.

PART 5

THE mud temperature in a rotary hole after circulation has ceased varies not only with time but also with the hole size. Inasmuch as the degree of caving depends to some extent upon the nature of the formations drilled, a temperature log made under such condition exhibits variations which are directly correlatable with the nature of the beds penetrated by the drill.

Temperature

Wells Not in Thermal Equilibrium

A. Rotary Holes

THE LAWS controlling the temperature distribution in formations which are in thermal equilibrium are fairly simple to investigate because only the conductivity and the dimensions of the media need be considered. Where a mathematical treatment is not possible, these laws can be readily established by conducting experiments on electrolytic scale models. On the other hand, the problem is much more complex when the media under investigation are not in thermal equilibrium. In such cases, more media have to be considered (the drilling mud, for example) as well as other physical quantities (specific heat, time). Evidently, an analytical solution of the problem is out of the question, and the only method of approach is to use electric analogues.

Unfortunately, the equipment which is necessary for this work is far more complicated, and the time involved for the measurements is far greater, than for steady state investigations. Because of these obstacles no laboratory experiments were made by the writer on unsteady state temperatures, and the data here offered are based mainly on actual measurements made in wells.

For the present purpose the wells are classified as follows:

1. Rotary holes shortly after mud circulation is discontinued,
2. Producing wells (oil gas, or water),
3. Wells recently cemented.

In all these wells the temperature of the fluid in the hole is usually different from the temperature of the formations situated at the same level close to the well. The latter, in turn, is different from the temperature which would be found if the well did not exist. For the sake of convenience these three temperatures will be respectively termed:

fluid temperature,
apparent formation temperature,
true formation temperature.

Effect of Mud Circulation

Referring to Figure 5-1, H represents the cross section of a rotary hole, 7500 feet deep for example. In first approximation it will be assumed that the apparent formation temperature equals the true temperature at all points. This temperature, T_F, is represented by graph F showing an increase from 60° at the top to 180° at the bottom. The nature of the formations penetrated need not be considered now. It will only be assumed that a few sections (marked C on the figure) caved appreciably, while the others (marked B) did not.

The temperature T_M of the mud immediately after circulation is discontinued is represented by graph M whose slope is much greater than the slope of graph F. Near the bottom, the mud temperature is appreciably less than the formation temperature at the same level, while near the top it is much higher. Therefore, graphs F and M intersect at a point P situated at some intermediate depth, 3000 feet for example.

If the well is left idle for several days, the mud will evidently cool in the upper part of the hole and warm up in the lower section until it reaches the formation temperature T_F. At any time during this intermediate stage the graph representing the mud temperature T is a curve which rotates from M to F. The rate of temperature change at any given depth D is controlled primarily by the two following factors:

1. The temperature difference $T - T_F$ at point D,
2. The volume of mud situated at that particular depth.

The difference $T - T_F$ is particularly great in the top section and in the bottom section of the hole. These sections will therefore exhibit the greatest and fastest temperature changes, while in the central section these will be much small-

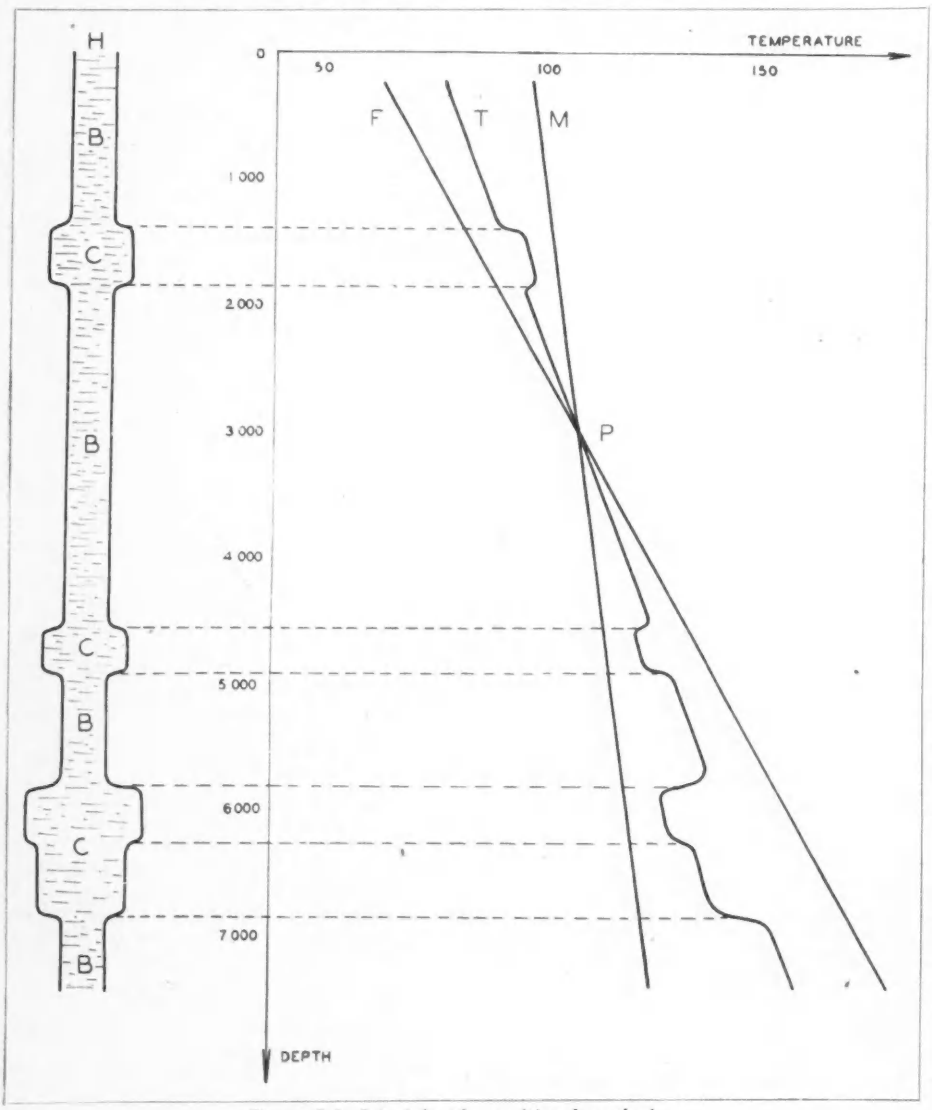

Figure 5-1. Principle of transitional method.

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Fifth of a series of seven articles, which are based upon research work sponsored by Halliburton Oil Well Cementing Company. Preceding parts have appeared in THE OIL WEEKLY of October 21 and 28 and November 4 and 11.

WELL LOGGING

By HUBERT GUYOD

er and slower, especially in the vicinity of point P.

If the hole had a uniform diameter, the transitional temperature graph T would, at any time, be approximately a straight line rotating about point P. However, because the hole is not uniform, the volume of mud opposite sections C is greater than the volume of mud opposite sections B and it will therefore warm up (or cool) slower than the latter. The result is that at any time during the transitional stage the mud temperature is greater at C than at B in the top part of the hole, while the converse is found in the bottom section. Of course, the greater the degree of caving, the greater will be the difference.

Temperature Graph Picks Shale Beds

To summarize, a temperature graph taken in a rotary well a few hours after circulation is discontinued exhibits temperature changes which are correlatable to the degree of formation caving. Usually, shales cave appreciably, while sands and sandstones do not. A transitional temperature graph will therefore exhibit significant breaks at formation boundaries.

Figure 5-2 illustrates the foregoing discussion. This figure represents two sections of a temperature graph, caliper log and electric log recorded in a Mid-Continent well. The graphs to the left are from a shallow section while those to the right were taken at much larger depths. The dash line shown on the temperature graphs is an imaginary base-line representing approximately the transitional temperature opposite sands sections or, more exactly, in sections where the diameter of the hole is approximately equal to the size of the bit. Where the actual temperature differs from that shown by the base line, the hole has an abnormal diameter, usually indicating the presence of a shale bed.

It is possible to calculate approximately the mud temperature T at a given point of the hole during the transient condition described above.

Consider a thin horizontal section of the mud column (Figure 5-3). Its volume is ΔV and its curved surface is ΔA. Let D designate the diameter of the hole, T_F the formation temperature, T_M the initial mud temperature, and T transitional mud temperature. At any time t after mud circulation ceased, the quantity of heat dQ transferred in the short time dt is proportional to the area ΔA, to the temperature difference $T_F - T$, and to the time interval dt.

$$dQ \propto \Delta A\,(T_F - T)\,dt$$

The heat transferred dQ is proportional also to the resulting temperature increase dT and to the volume of mud considered,

$$dQ \propto \Delta V \times dT$$

ΔA and ΔV are proportional to D and D^2, respectively. Combining the fore going relations gives:

$$\frac{dT}{T - T} = -\frac{C\,dt}{D}$$

where C can be considered as being a constant in first approximation.

Integration between temperatures T_M and T_F gives the transitional temperature at any time t after circulation stopped.

$$T = T_F - (T_F - T_M)\,e^{-\frac{Ct}{D}} \qquad (1)$$

This relation is only approximate because it was established with

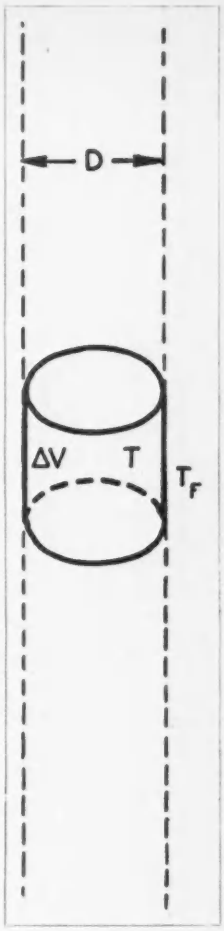


Figure 5-3

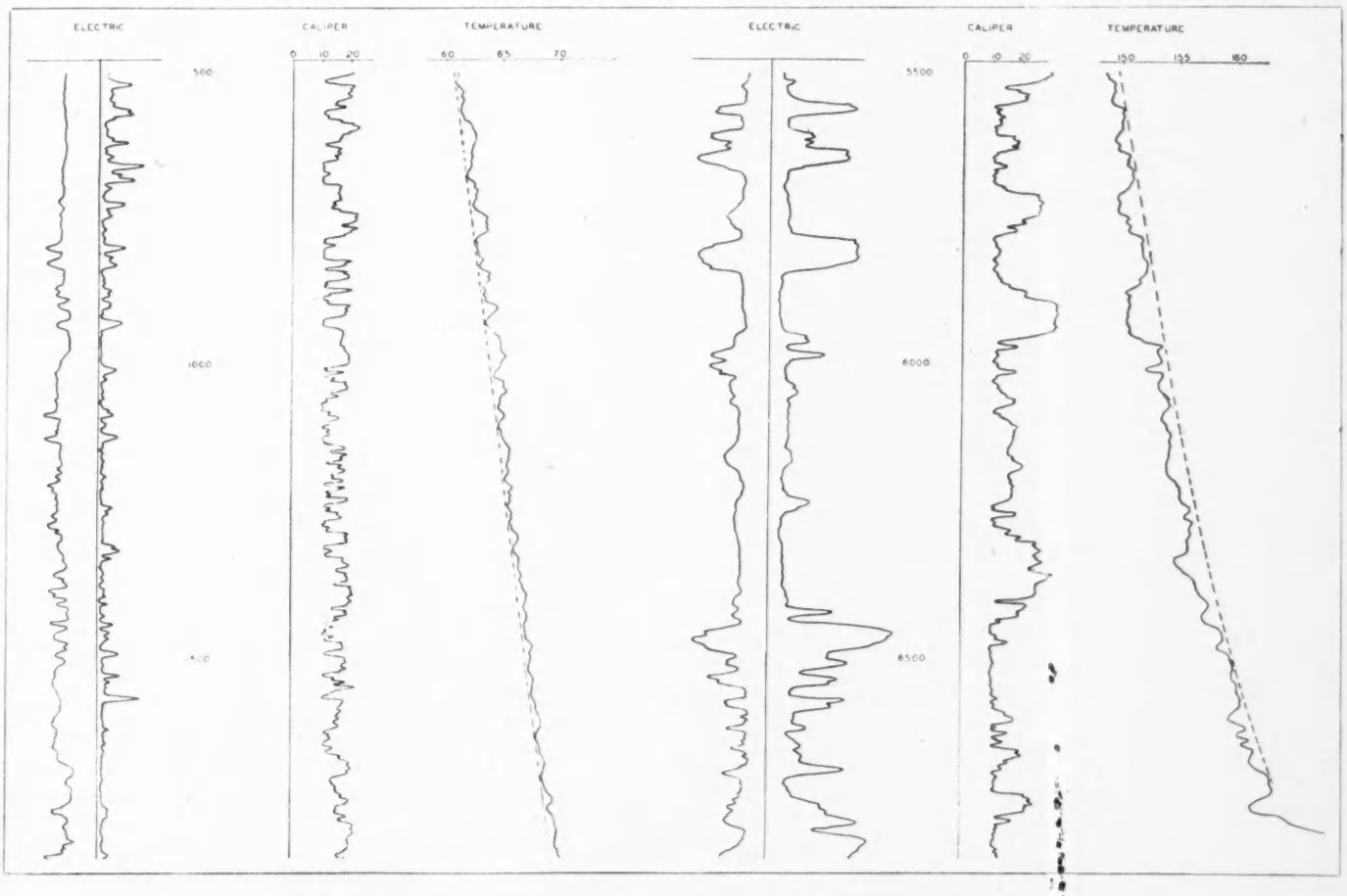
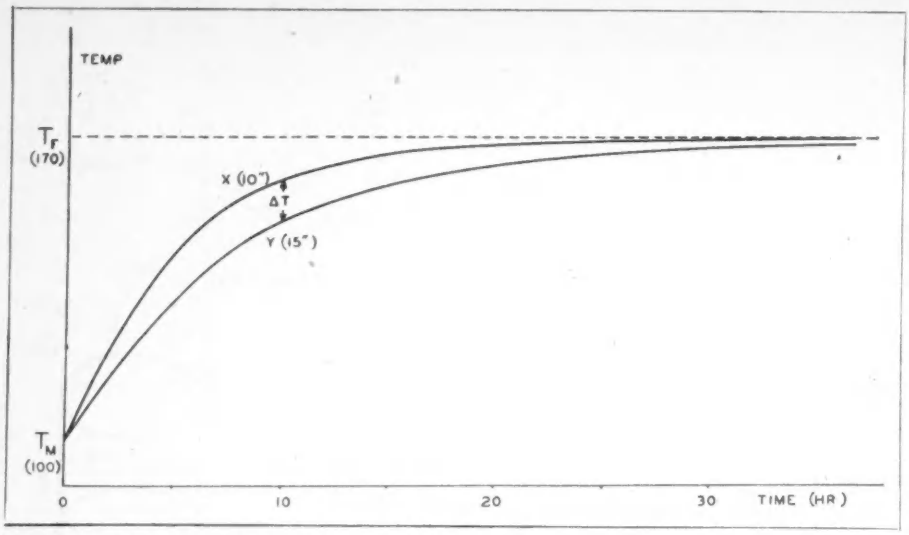
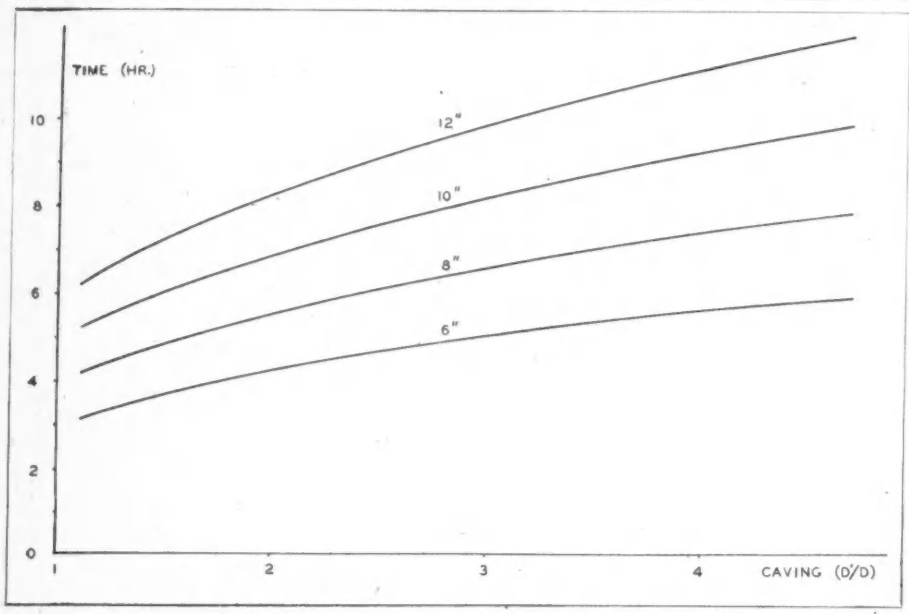
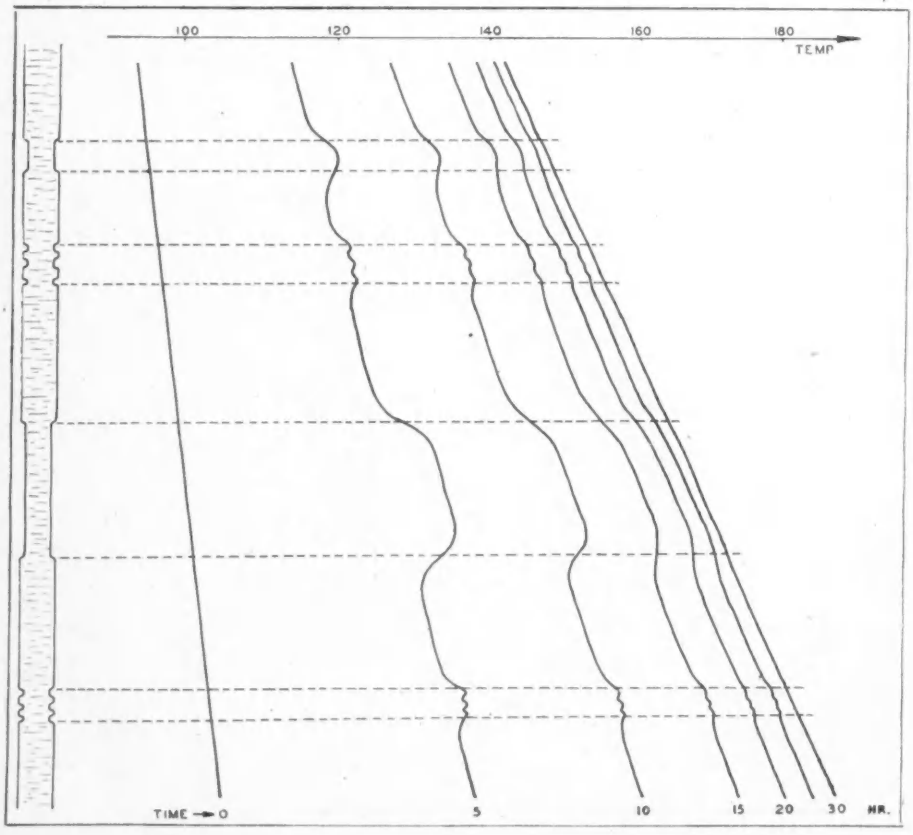


Figure 5-2. Electric log, caliper log and temperature log from an Oklahoma Well.







the assumptions that the apparent formation temperature T_F is constant and that the mud temperature is the same in the center of the hole as on the sides. Relation (1) gives therefore for the mud column an average temperature T which is different from the actual average temperature, especially for muds in which there is little convection (gel type muds). Nevertheless, this relation gives an excellent qualitative idea of how the mud temperature varies with time, especially if the influence of the foregoing factors is embodied in the factor C.

Although the quantity C varies slightly with the type of mud and the size of the hole, in this work it will be assumed that it is a constant. From a few temperature logs it is estimated that C is of the order of 2 when the temperature is in degrees Fahrenheit, the hole diameter in inches and the time in hours. Using this value of 2 in equation (1) shows that in a seven-inch hole, the temperature increase has reached half its total value after about 2½ hours. Evidently, the rate of increase diminishes appreciably thereafter. Also, in holes of large diameter the temperature rise is less than indicated above for a seven-inch hole.

The foregoing remarks are summarized on Figure 5-4 which represents the time-temperature graphs X and Y for hole diameters of 10 inches and 15 inches respectively. The temperature values are relative and the ordinates can be calibrated to fit any desired condition, for example, for a formation temperature of 170° and an initial mud temperature of 100°.

Maximum Anomaly

The temperature difference (i.e., temperature anomaly given by the log) observed in the mud column between a section which cave (diameter D') and one which does not cave (diameter D) is measured by the difference in ordinate ΔT between graphs X and Y.

$$\Delta T = (T_F - T_M)\left(e^{-\frac{Ct}{D}} - e^{-\frac{Ct}{D'}} \right) \qquad (2)$$

It is found from this equation that the maximum anomaly occurs at a time t_M given by the following expression:

$$t_M = 1.15 \frac{DD'}{D - D'} \log_{10} \frac{D}{D'}$$

which is graphically represented on Figure 5-5 in terms of D'/D (relative caving) and for several values of D (bit size). It can be seen from this chart that with the usual bit sizes (7 to 10 inches) and caving (D'/D less than 2) the maximum temperature anomalies are observed from about four to seven hours after circulation is discontinued. After that time the anomalies become less, but they do not diminish appreciably until ten to fifteen hours after circulation is stopped.

Referring to Figure 5-5, it is seen that the maximum anomalies found in a hole whose diameter varies from ten to fifteen inches (Figure 5-4) are observed six

Figure 5-4 (top). Approximate mud temperature in terms of time after mud circulation is discontinued.

Figure 5-5 (middle). Chart for estimating time at which maximum transitional temperature anomaly occurs.

Figure 5-6 (bottom). Transitional temperature logs taken at regular time intervals (computed from preceding charts).

hours after circulation is stopped. The numerical value of these anomalies equals about 15 percent of $T_F - T_M$. Ten hours later ($t = 16$) the anomalies are reduced to about 4 percent of $T_F - T_M$. In deep holes where $T_F - T_M$ may reach 70°, this represents 3°, which is easily measurable with good accuracy.

In the top section of deep holes the temperature decreases, instead of increasing, after mud circulation is stopped. Nevertheless, the foregoing discussion and charts still apply provided the correct numerical values are used.

Influence of Convection

The graphs of Figure 5-4 were obtained with the assumption that heat transfer takes place between mud and formation only. Actually, because of the temperature differences existing between two adjacent hole sections having a different diameter, there is also some heat transfer by convection and conduction between these points, and the temperatures observed are slightly different from the values given by the graphs X and Y. They are comprised between these graphs, but the divergence is extremely small during the first hours. It becomes important only after 24 to 36 hours. After about 48 hours, depending upon conditions, the depth-temperature graph becomes generally so smooth that it does not permit locating formation boundaries unless the shales exhibit a considerable degree of caving, or unless the various beds in contact are very thick.

From the graphs of Figure 5-4 it is possible to construct approximately the depth-temperature logs which would be obtained at regular time intervals after circulation ceased. An example of such hypothetical logs is shown on Figure 5-6. Actual measurements verify this result, at least qualitatively.

Influence of Other Factors

It has been assumed in the preceding discussion that the apparent formation temperature equals the true temperature. In reality, the formation close to the bore hole is subjected for many days or weeks to the thermal influence of the mud stream. Its temperature is therefore different from the true formation temperature. For example, in horizontal sediments the isogeotherms in the vicinity of the bore hole are not horizontal but they are considerably warped as shown schematically by Figure 5-7. The result is that graph F of Figure 5-1 no longer represents the limiting mud temperature. The latter should be represented by a graph having a smaller slope and a slightly different shape. The mud temperature reaches asymptotically the apparent formation temperature which, in turn, reaches asymptotically the true formation temperature. Nevertheless, the time-temperature distribution discussed above would still be qualitatively the same.

A few other factors play also a certain part in the temperature changes observed in rotary holes, for example:

1. The specific heat of the drilling fluid, which is greater for water base mud than for oil base mud,
2. The specific heat of the formation, which is usually greater for sands than for shales,
3. The heat conductivity of the formation, which is also greater for sands than for shales,

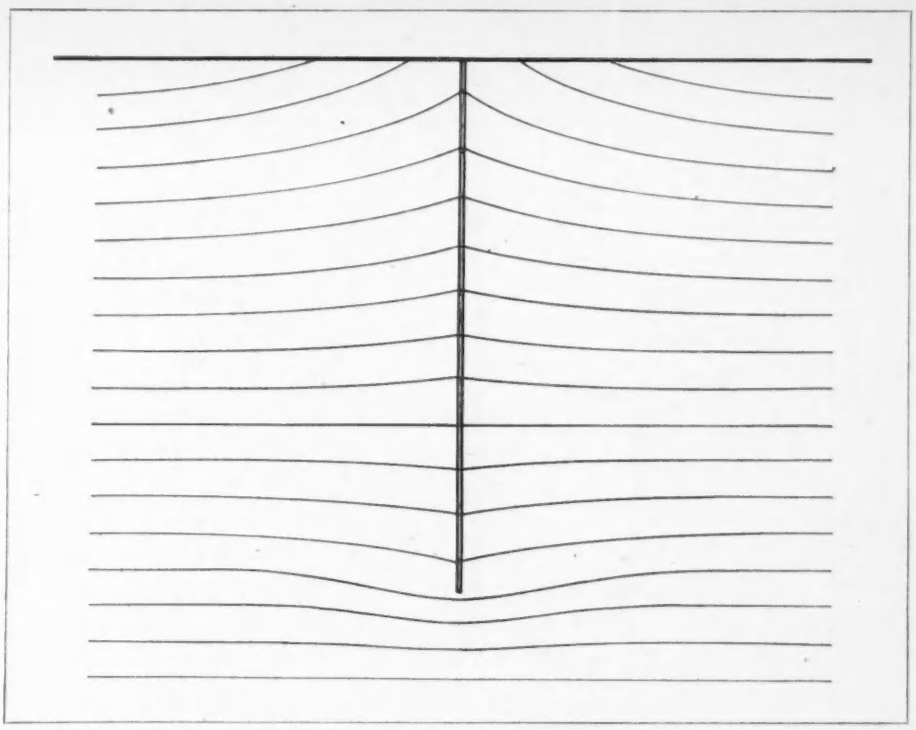


Figure 5-7. Vertical cross-section of isogeothermal pattern in the vicinity of a rotary well (estimated).

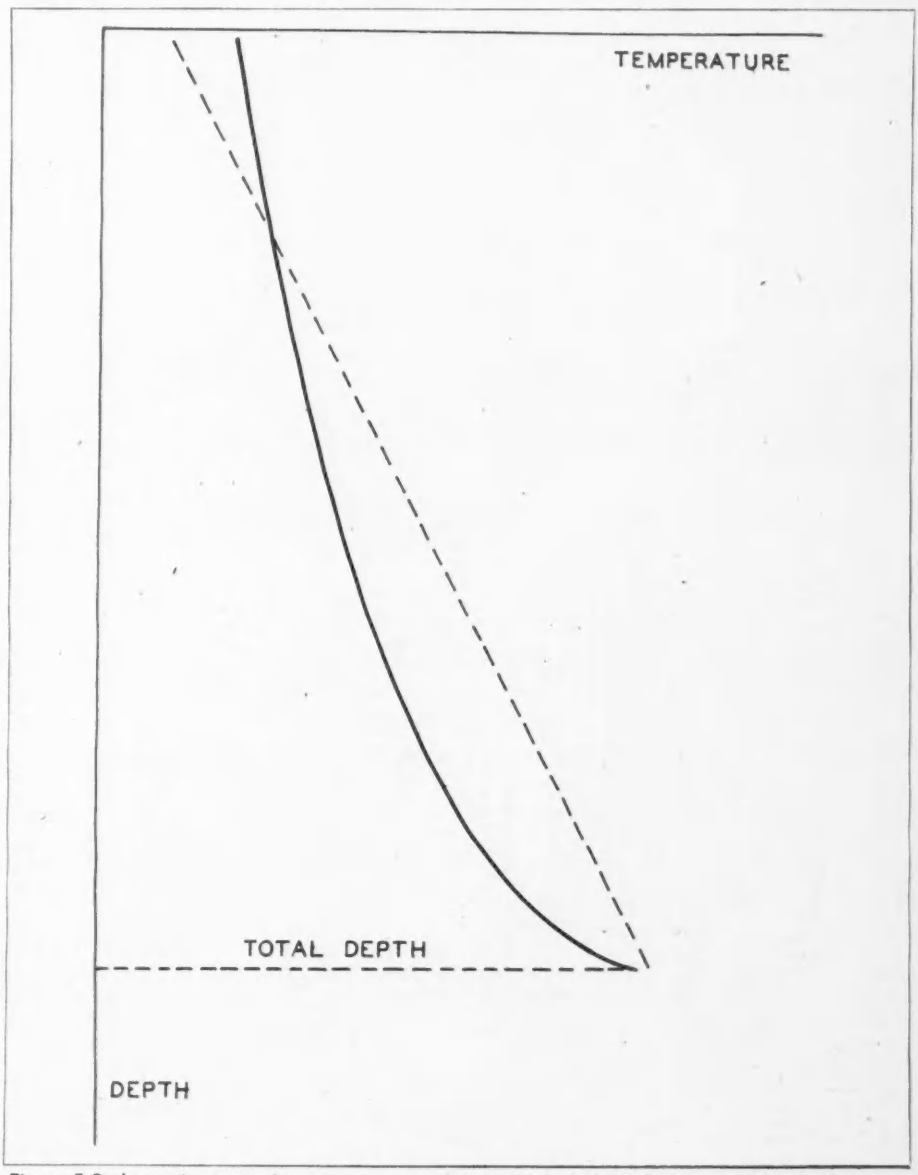


Figure 5-8. Approximate mud temperature graph in a rotary hole drilled at a relatively fast rate.

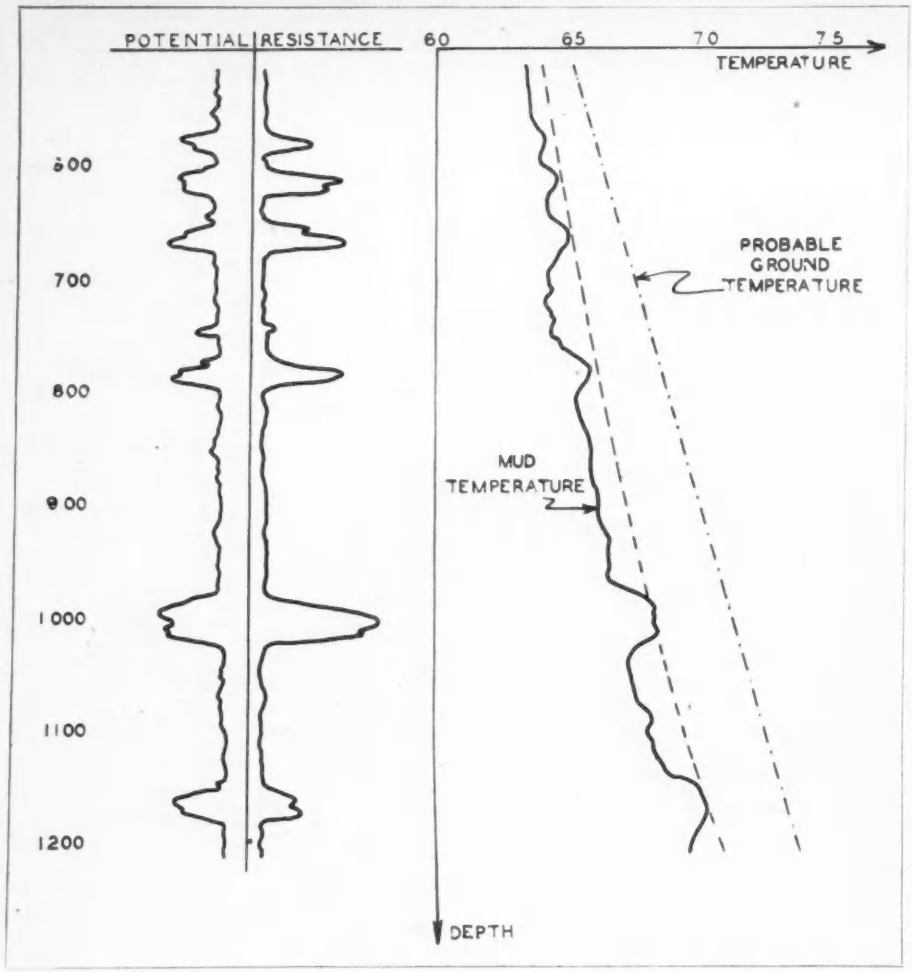


Figure 5-9. Electric log and temperature log of a shallow hole (South Texas).

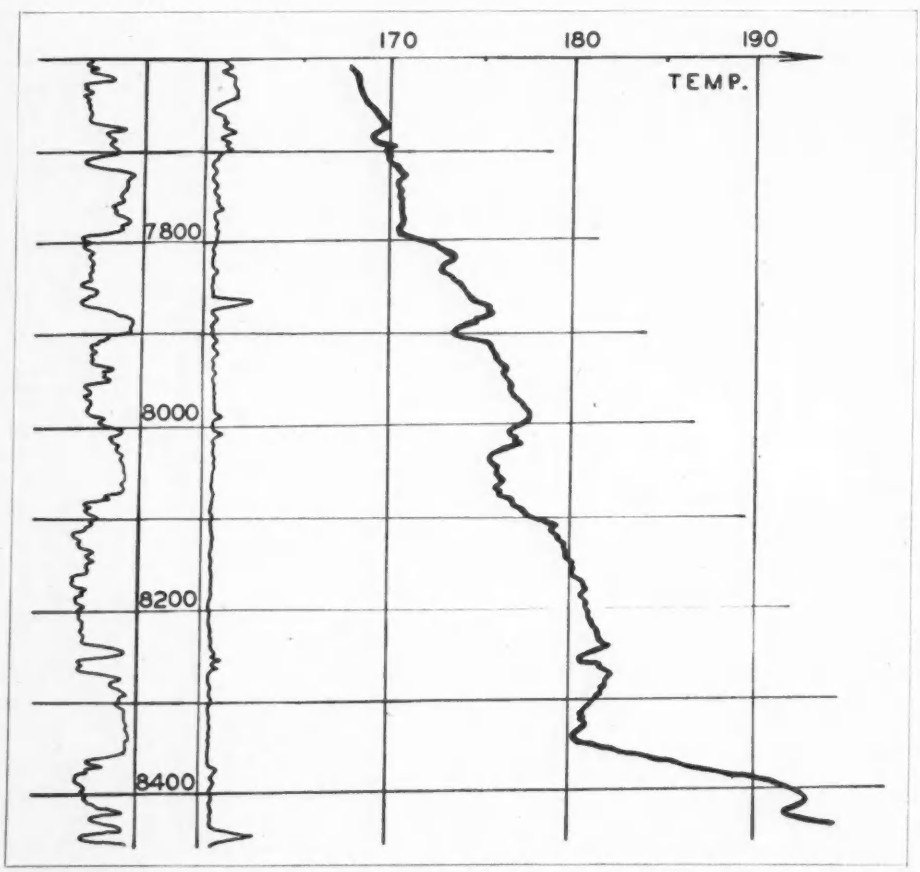


Figure 5-10. Electric log and temperature log from a Lake Peigneur well (Louisiana Gulf Coast).

4. The heat evolved by friction of the bit and drill pipes,
5. Chemical reactions between mud and formation.

The effect of (2) and (3) is usually to increase the temperature anomalies caused by hole diameter changes but it is probable that these effects are very small as evidenced by the extremely small anomalies observed in wells where shales do not cave appreciably.

The effect of factors (4) and (5) is generally small also. It may account for part of the abnormally high mud temperatures found in the bottom section of rotary holes (see Figure 5-8). It is probable, however, that a large part of this high temperature is due to the fact that the bottom formations have not been subjected for a long time to the cooling effect of the mud stream. Their temperature is much greater than higher up, and the transitional temperature of the mud must therefore be much greater than at some short distance above.

It should be finally noted that the change in the slope of a depth-temperature graph observed at formation boundaries in wells which are in thermal equilibrium (see part 4 of this series) does not exist on a transitional temperature curve. This effect is entirely dominated by the influences discussed above.

Shallow Holes

The relative position of graphs F and M is not necessarily as shown on Figure 5-1. For instance, if a relatively shallow hole is drilled in very cold weather, the mud temperature may remain less than the formation temperature in the whole section penetrated. In this case, the mud temperature opposite sands is greater than opposite caving shales, although the well is very shallow (Figure 5-9). Of course, this result will be found only if shales cave more than sands. If the opposite condition exists, the temperature opposite sands is evidently less than opposite shales.

Cased Holes

The temperature anomalies which exist in an open hole are found also when the measurements are made after the well is cased, and even when the casing is cemented.

In the sections which are cased but not cemented, the condition is very similar to that existing in open hole. The only difference is that part of the mud or water is inside the pipe while the other part is outside. But, because of the relatively great heat conductivity of steel, the casing does not impede the heat transfer from the inside mud to the outside mud, and from there to the formation. The resulting temperature graph cannot be much different from that which would have been obtained in open hole under the same conditions.

In holes which are cased and cemented, the situation is different, although the result remains about the same. In the sections which had cavities when the well was still open, there is considerably more cement than where the hole was to gauge. Now, Portland Cement has a somewhat smaller heat conductivity than ordinary sediments (1 to 2×10^{-3} C.G.S.). It will therefore impede to some extent the exchange of heat between the fluid in the hole and the formation outside. The greater the amount of cement, the slower will be this exchange of heat. In

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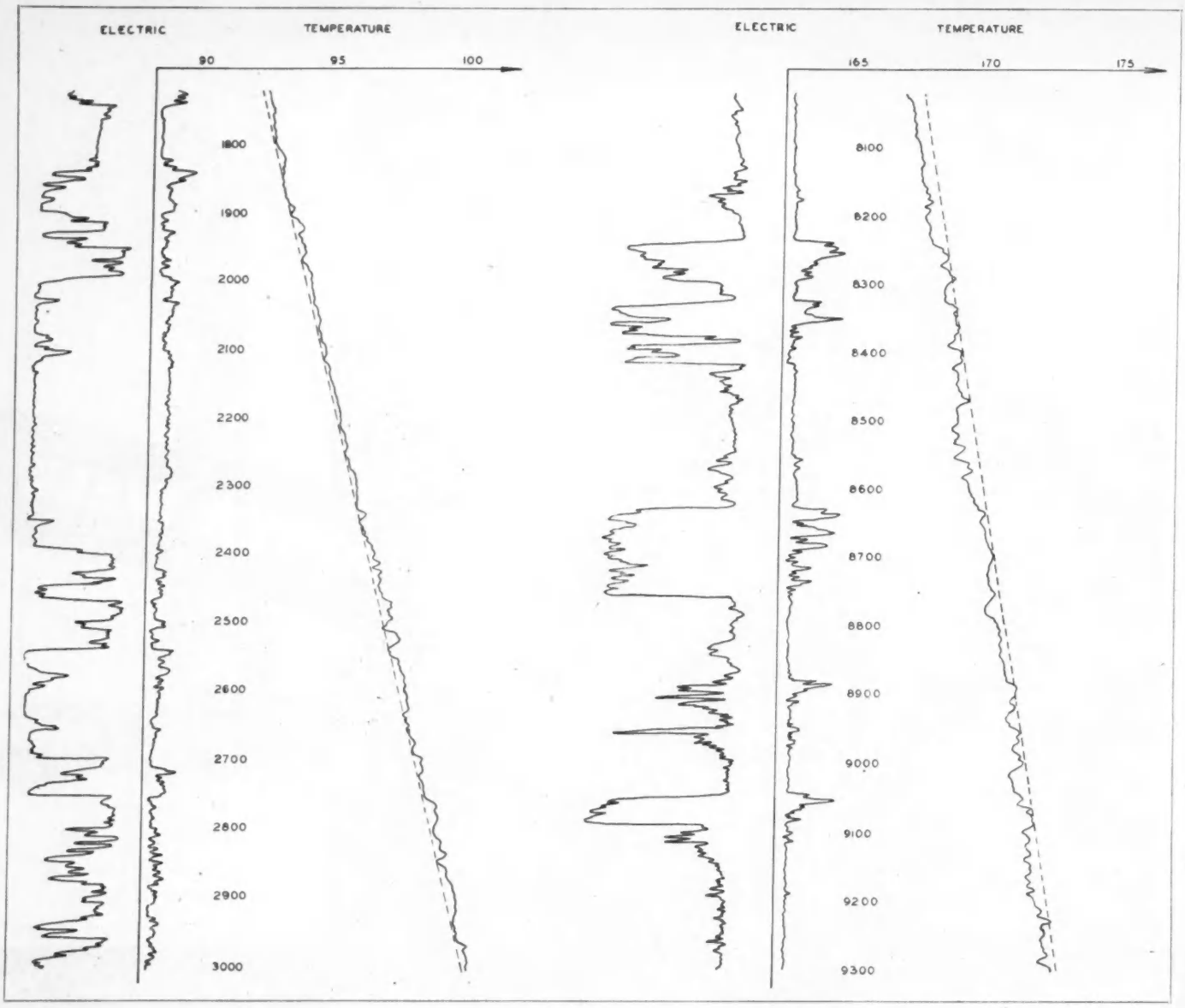


Figure 5-11. Electric log and temperature log from a well of Quarantine Bay field (South Louisiana).

Courtesy Gulf Oil Corporation

the bottom part of the hole, for example, the transitional temperature will be less than normal opposite the sections containing large amounts of cement. When it is remembered that the latter correspond to those sections which exhibited some caving when the hole was still open, it will be appreciated that, qualitatively, the transitional temperatures in open holes and in cemented holes are qualitatively analogous.

From the logs available it is felt that the transitional temperature anomalies are somewhat greater in wells containing a cemented string of pipe than in open holes, all other factors remaining the same.

Figure 5-10 represents the temperature log of a section of a cased hole in South Louisiana. By comparing this graph to the electric log given also, it can be seen that relatively large temperature differences exist between sands and shales.

Limitations of the Method

The foregoing presentation may leave the impression that transitional temperature measurements are well adapted to the logging of wells, either open or cased. Although this is correct to a certain extent, the method has a few limitations which sometimes prohibit its use.

1. It has been explained that transitional temperature anomalies are primarily caused by changes in the size of the hole. If the physical characteristics of the formations drilled, or the drilling method, are such that the diameter of the hole does not change much from bed to bed, the temperature anomalies are small and the interpretation of the log is very difficult. For example, referring to Figure 5-11 it can be seen that the temperature changes from sand to shale are not always significant. If no electric log were available, the temperature data alone would not be very reliable for the location of sands or shales. On the other hand, if the shales traversed cave consistently, a temperature log may be as reliable as a caliper log or a potential graph in many sections of the hole (Figure 5-10). In general, shales of Eocene age or older cave appreciably and can be located by transitional temperature measurements. Younger shales cave irregularly, and the resulting temperature data are frequently unreliable.

2. If formation changes are accompanied by appreciable hole diameter changes, the method can be applied successfully except in the center section where graphs M and F of Figure 5-1 are close together. This inactive section is usually 1500 to 2500 feet thick. Of course, a second temperature run can be made under different thermal conditions in order to bring the new pivotal point P several thousand feet higher or lower than it was during the first run. From the two runs it is then possible to obtain a complete log of the hole. This procedure is evidently time consuming and may be objectionable in certain instances. A similar remark can be made regarding the bottom section of rotary holes being drilled at a rather high speed (see Figure 5-8) in which the mud temperature is not very different from the formation temperature.

3. From Figure 5-4 it can be seen that transitional temperatures favorable for

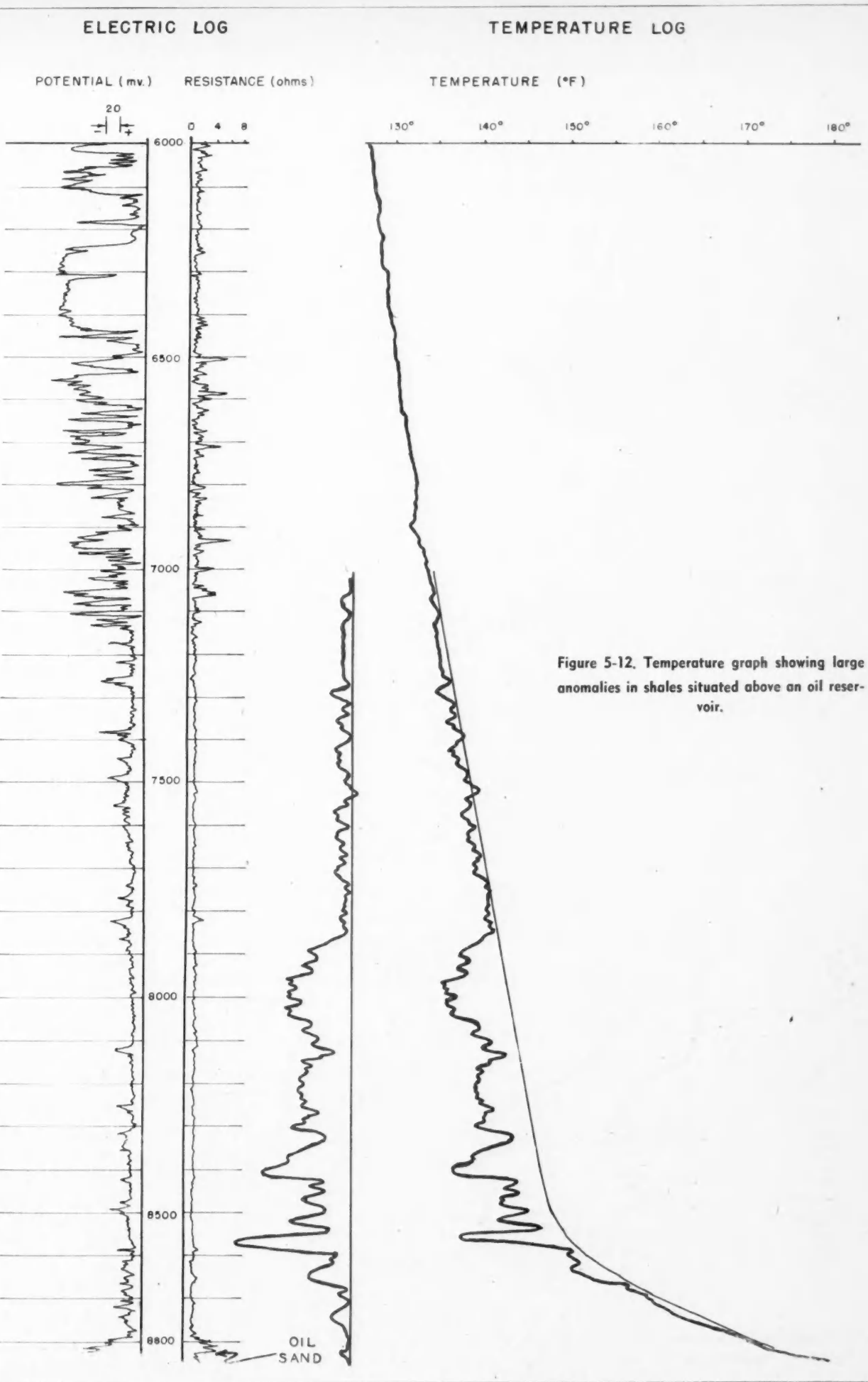


Figure 5-12. Temperature graph showing large anomalies in shales situated above an oil reservoir.

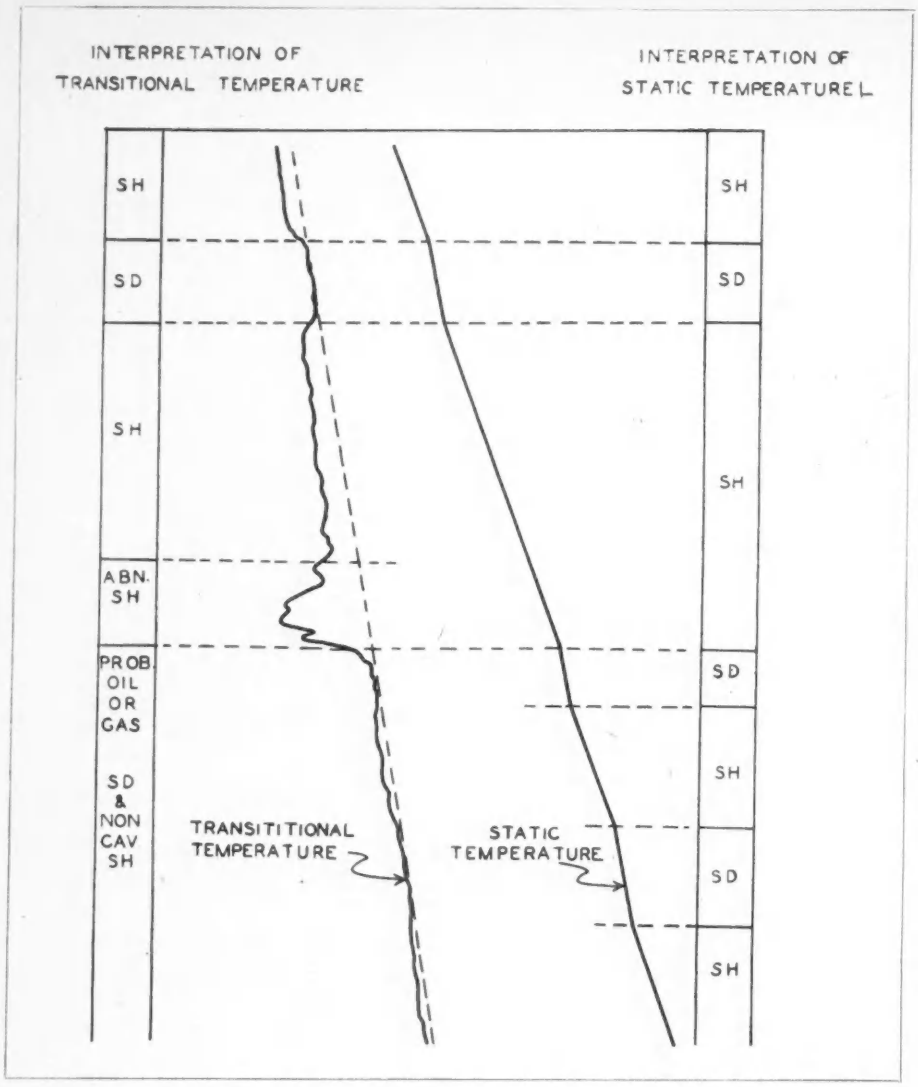


Figure 5-13. Interpretation of temperature data.

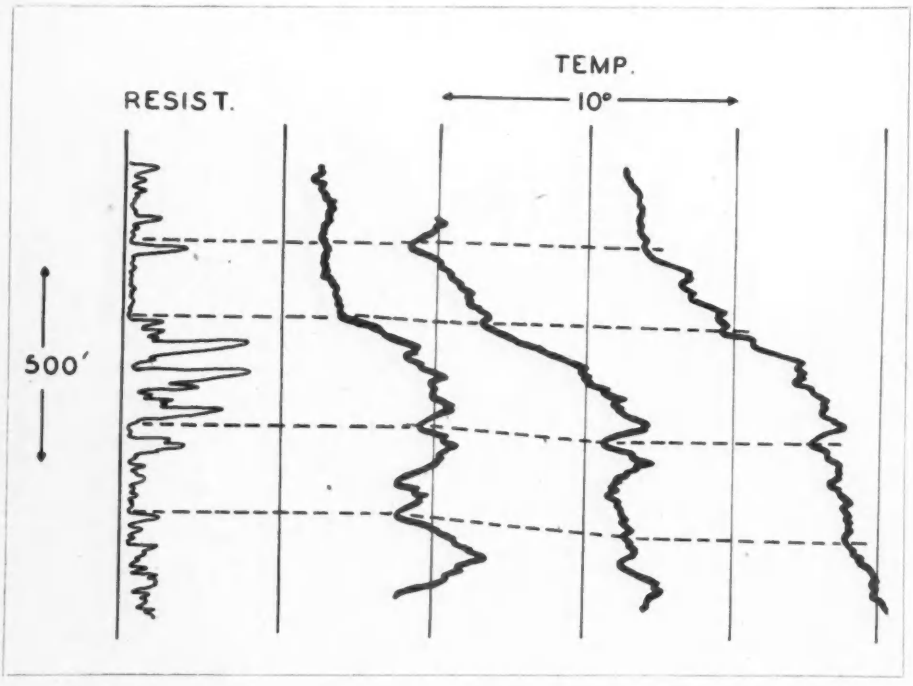


Figure 5-14. Transitional temperature graphs of three wells of the Rodessa field (Louisiana), showing good correlation in the anhydrite section.

After Denssen & Guyod, courtesy AAPG

logging are found from a few hours up to about 24 hours after circulation is discontinued. Measurements made later give a log which is sometimes so flat that formation boundaries cannot be picked unless there is considerable caving in shales.

To summarize, a transitional temperature log is, at best, a non-calibrated caliper log. In open holes, it cannot compete technically with an electric log or a caliper log. In cased holes, it usually cannot compete with a radioactivity log except in certain areas where radioactivity interferences exist. On the other hand, when electric logs, or radioactivity logs cannot be used, transitional temperature logs have a real value.

Abnormal Shales

Shales associated with petroleum reservoirs frequently cave to a much greater degree than those interbedded with water bearing formations[2]. These abnormal shales vary in thickness from a few feet to several hundred feet. A transitional temperature graph having penetrated this type of shale, for example, at a depth greater than 3 or 4000 feet, will exhibit an abnormally low temperature in the corresponding section. An example is represented on Figure 5-12 where the electric log shows an oil sand at 8800 feet and oil bearing shaley sands above. It can be seen from the temperature log that extremely large cavities exist in the shale section situated above the petroleum reservoirs. To illustrate this more clearly, the resulting temperature anomaly has been replotted with reference to a straight base line in the center column of the plat.

Temperature measurements can be made for the particular purpose of locating abnormal shales as an indirect method of finding petroleum reservoirs. However, it should be remarked again that, if the hole is still open, better results will probably be obtained from a caliperlog. On the other hand, if the well is cased, a transitional temperature log can be of very great value. This graph, accompanied if possible, with a temperature graph made when the well is in thermal equilibrium (or with a radioactivity log) should frequently find petroleum reservoirs where no other known method would succeed. The hypothetical graphs of Figure 5-13 show how the data are interpreted.

Correlations

Since, under certain conditions, transitional temperature measurements can be used for logging, many formations can be correlated from well to well by means of temperature graphs made under proper conditions. Figure 5-14 is a plot showing the temperature logs made in the anhydrite section of three wells of the Rodessa field, North Louisiana.

Conclusion

At present, it seems that transitional temperature logs in uncased rotary holes have almost no practical value if other types of logs are available. In cased holes, they are very useful in several instances, in particular if abnormal caving exists above petroleum reservoirs.

The data presented in this artice, although not always quantitatively correct, are nevertheless representative of the usual thermal conditions existing in rotary holes.

[1] Hubert Guyod, "Caliper Well Logging, Part 2," The Oil Weekly, September 3, 1945.
[2] Hubert Guyod, "Caliper Well Logging, Part 3," The Oil Weekly, September 10, 1945.

Posters such as this encourage employes to adopt good safety habits.

FUNDAMENTALS OF INDUSTRIAL Accident Prevention

Part 13
Material for Safety Talks

By C. L. HIGHTOWER
Safety Director, United Gas Pipe Line Company and Union Producing Company

THE accompanying material has been provided for foremen, department heads and others in preparing safety talks for presentation to employe groups.

In their present form the outlines are designed to cover specific accident problems and hazards in a concise and direct manner. However, the material may be supplemented or revised to suit the convenience of the speaker and to meet the needs of the group.

LOOKING BACK AND PLANNING AHEAD

We can not expect to make progress unless we plan and work for it. Since safety is both an individual and a cooperative undertaking, there must be both group and individual planning.

Past accidents might be helpful in planning for today's safety. The record shows that the following operations contribute the greater percent of accident cases:

1. Handling material.
   a. Loading.
   b. Unloading.
   c. Carrying.
   d. Stacking.
2. Using hand tools.
   a. Using the wrong tool.
   b. Use of defective tools.
   c. Improper use of tools.
3. Operation of machinery and equipment.
   a. Caught in lines and ropes.
   b. Caught in gears.
   c. Loads dropping on hands and feet.
4. Chipping, grinding and cutting operations.
   a. Foreign bodies in eyes due to not wearing goggles.
   b. Foreign bodies in eyes due to wearing improperly fitting goggles.
   c. Puncture wounds to body from flying metal particles.
   d. Mashed and bruised hands from tools slipping.
5. Poor housekeeping.
   a. Puncture wounds from nails.
   b. Stumbling over loose objects.
   c. Falling tools and material due to improper storing or piling.
6. Operation of cars and trucks.
   a. Injured in collision with other vehicles.
   b. Alighting from or boarding moving vehicles.
   c. Improper seating of men and loading of material on trucks.
7. Scaffolds and ladders.
   a. Falls from scaffolds and ladders due to losing footing.
   b. Use of makeshift ladders, i.e., tables, chairs, etc.
   c. Defective ladders and scaffolds.
8. Fires and explosions—all operations.
   a. Flare-backs in lighting boilers.
   b. Smoking in gas areas.
   c. Using open flame lights in gas area.

A few injuries resulting from "horseplay," insect bites, snake bites and poison ivy also claimed their victims.

The significant thing about those accidents of a seriously disabling nature and those that might have but did not cause serious injury was the fact that several things went wrong at the same time. As an example: A crew was pulling rods and using equipment consisting of a winch powered by a diesel engine and mounted on a truck. When the string of rods had been raised 2½ or three feet, the clutch on the pulling machine slipped. The brake would not hold and the rods dropped back into the hole. The injured man had been stripping paraffin from the rods by hand and when the rods fell his hand was caught between the elevators and the top of the well head. Three things happened at just the right time to cause this accident.

First: Injured had his hand in the wrong place. Had he been using a rope to strip the rods the accident still would not have happened even though the clutch slipped.

Second: The clutch was out of adjustment, causing it to slip out just at the right moment to cause the accident.

Third: The brake would not hold and the operator could not stop the load when the clutch slipped out.

Eternal Vigilance

When we analyze the basic causes of almost any accident, we find that seldom is just one misstep responsible. This fact points to the need for eternal vigilance insofar as safety is concerned and indicates that we must watch everything—material, equipment, and methods—if we are to steer clear of an accident.

The list of accident causes as given above reveals that they are about as varied as the job itself. No operation, no location can be classed as accident-free. Even the office has its share of tripping and falling accidents. This fact indicates that the remedy for accidents rests with us. If a man can hurt himself in the comparative safety of an office with equipment no more hazardous than a swivel chair and a fountain pen just as easily as the man on the derrick floor operating fast-moving and heavy drilling equipment, then the causes must be within us and not the things with which we work.

If we plan, we can prevent. Group planning—that is, the planning that is necessary on the part of the crew, the department or the district, in order to promote safety includes these steps:

1. Setting up a definite schedule for inspecting tools, equipment, machinery and other physical property and making repairs and replacements necessary to avoid mechanical failures.

2. Holding safety meetings regularly and talking about safe methods of work as well as safe conditions.

3. Providing adequate protective equipment and seeing that its use is understood.

There is Not Room on Any Job
For AN UNSAFE WORKER

BETTER LOSE A BET THAN LIVE IN REGRET !

4. Taking time to break the new man in right. Teach him safety before an accident does.

5. Taking time to plan each job. Orderly procedure gets the job done on time and with safety.

6. Studying each new job or unusual operation. Figure out how to get the job done before you start.

7. Promoting and practing cooperation.

Individual planning means first accepting a place in the safety program. George can't do your safety job for you any more than George can think for you. Base your safety planning on these fundamentals:

1. Keep healty. An ill body can not house an active, alert mind.

2. Study your work habits. Analyze the job for possible hazards and then correct whatever you find wrong.

3. Never take unnecessary chances and remember to **ask** if you don't know or if you are not sure.

4. Don't hang safety up with your overalls. Take it home and dish out some to the family.

There need not be any accidents. They are caused, and for every cause there is a remedy. We will not be able to find and apply the remedy, however, unless we plan ahead.

MY RESPONSIBILITY

We often hear the word "responsibility" in speaking of accident prevention work. That such a responsibility rests with the individual is unquestioned, but it is well to consider that along with these responsibilities there are also opportunities.

The individual's responsibility in the accident prevention program may be summed up as follows:

A. He should know his job and be thoroughly familiar with the probable hazards and the precautions to follow.

B. He must perform his own work so that he will not create or leave hazards which may cause accidents involving other employes.

C. He has the responsibility of informing the "green" man and showing him the safe way.

D. He should know first aid, and it is absolutely essential that he know how to give artificial respiration, since accidents requiring such treatment are likely to prove fatal unless treated promptly and correctly.

E. He is obligated not only to attend safety meetings but also to take an active part in them.

F. He should report all hazards and unsafe practices and also follow up to see that some action is taken after these reports are made.

G. He is responsible for taking protective equipment out on the job just as he takes any tool with which he works.

H. Last, but not least, he has the responsibility of passing along to his own family and other people on the outside the message of safety.

What are the opportunities that go with these responsibilities? In the first place, as the worker discharges his responsibilities as an individual in the accident prevention program, he finds the opportunity to learn more about his job and his company. In talking correct methods we also talk efficient methods and develop methods of improving job technique. Full participation in the safety program also gives an individual an opportunity to better understand the men with whom he works, to cooperate more closely with them, and to profit from the closer relationship that will follow. The opportunity of informing one's own family as to accident causes and that of passing this information along to the public brings results that are very definite. The accident burden is lessened and the friendship and good will of the public is enhanced.

ESSENTIALS OF SAFETY

If I were called upon to list the requirements necessary for establishing an individual no-accident record, I would stress these five things:

1. That the individual must be convinced in his own mind that accidents are caused and are not just "happensos"; and, since there is a cause for every accident, there is a remedy.

2. That accidents are serious enough and the effects so devastating insofar as the individual is concerned that thought and effort must be given to their prevention.

3. That a man must know his job, must plan his work, harmonize his efforts with those with whom he works and take pride in doing his job well.

4. That unnecessary chance-taking, haphazard methods, and an uncontrolled temper are the most frequent man-made causes of accidents.

5. That safety must be made a part of our mode of living and put into use on the job, on the highway, and in the home.

The individual who realizes these essential factors and who accepts safety as an individual responsibility stands a much better chance of avoiding a disabling injury than does the person who ignores these principles of safety.

GETTING THE JOB DONE RIGHT

1. There is a best way of doing everything. We can take a cold chisel and hammer and loosen a nut so that it can then be unscrewed by hand, but that is not the best way to remove a nut. In the first place, it's a slow and inefficient method and also there is danger of damaging the nut as well as hurting ourselves in the process. This reasoning proves two things: First, there is a best way to do everything; and second, that doing a job the right way and doing it the safe way are one and the same thing. We have to be convinced of this fact in our own minds before we can accept safety without question and apply it to our own every-day thinking and planning.

2. With this fundamental principle firmly established in our minds we can then proceed with the other factors that enter into doing a job correctly and safely. These factors may be summed up under six general headings:

a. Time. We must consider when the job has to be completed in order to get the manpower and equipment necessary to finish the job on schedule. Ignoring this factor is what makes rush jobs.

b. Equipment and tools. Failure to have the right tools and equipment to work with causes delay and chance taking. Either the job is held up until the right tools are obtained or you take a chance on using equipment less well suited for the task.

c. Manpower. This means not only having sufficient help available but also having qualified men and assigning them properly to their respective jobs.

d. Protective equipment. Goggles, spark-resisting tools, hard hats and the like should be considered just as much a part of the crew's equipment as wrenches, hammers, etc. Not to have them available is no more excusable than having them there and not using them.

e. Planning. No job progresses smoothly unless the work is planned step by step and each man is thoroughly instructed in the part he is to play in the setup.

f. Cooperation and harmony. Last but not least is the desire and the will to work together. Friction or lack of understanding among a group throws the entire machinery out of gear and acceptable results are impossible when such a situation exists.

3. Getting the job done right requires a lot of thought, planning and cooperation, but the results will be evident not only in increased efficiency, but in safe operations as well, because "getting a job done right" is just another way of saying "getting it done safely."

A HELPING HAND FOR SAFETY

It is not only the new man on the job who needs a helping hand in order to keep out of accidents. Sometimes the old-timer, because of his familiarity with the work, develops habits of chance-taking, and he, more than anybody else, needs a helping hand. Likewise, the temperamental fellow who flies off the handle at the slightest provocation needs a lot of help in order to keep out of accidents.

Almost everyone is willing to give a helping hand for safety, but the difficult thing seems to be determining when and under what conditions help is needed. It would be impossible to enumerate every occasion upon which a word of advice or warning should be given, but by listing a few conditions under which help might serve to prevent an accident, we may be able to better determine how we can extend this helping hand for safety:

1. A new man coming to work in a strange crew should be made to feel at home. He may be reluctant to ask questions, and even though he is experienced, he may not be familiar with the exact manner in which the crew runs. A friendly word of advice and a few suggestions on protecting himself against the common hazards of the work will be appreciated and also will go a long way toward establishing a good safety record.

2. The fellow who uses the first tool at hand, rather than taking time to get the proper tool to do the job with, certainly is in line for a word of warning.

3. The man who wears his goggles around his neck or on his forehead when metal pieces are flying around, in pouring hot dope or when working around the welder, needs some advice on eye protection.

4. A driver who persists in looking at his fellow-passenger while conversing needs to have the danger of driving with his eyes diverted from the road explained to him.

5. Likewise, the driver who passes cars on hills, drives with only one hand on the wheel, follows the other car too closely, and takes other unnecessary chances, needs to be forcibly impressed with the error of his ways.

6. The practical joker, who enjoys putting a lighted match in somebody's pocket, or pulling other unsafe and silly stunts, should be given a good, straightforward talk.

Coming Soon

POWER DISTRIBUTION SYSTEMS FOR OIL FIELD PUMPING SERVICE

By W. C. BLOOMQUIST and J. N. POORE

Watch for It

USING AND STORING INFLAMMABLE MATERIALS

Gasoline and kerosine fires and explosions in the home are still a source of many fatal injuries. Almost every issue of the daily papers carries a story of a fatal or serious accident resulting from the misuse or negligent handling of inflammable products in the home. Apparently these stories are not widely read, or at least they do not seem to make a very deep impression, as unsafe practices continue to be followed and such accidents continue with frequent regularity.

It is unfortunate that most people never think of accidents in the first person. In reading a report of an accident or observing an unsafe practice, we do not stop to consider that such an accident could happen to us or that we might get caught by taking the same or similar chance which we condemn the other fellow for taking.

Perhaps the following reports on accidents resulting from negligent use or handling of inflammable products in the home, will bring to mind some of the things we are doing wrong at our own homes.

1. A woman was using a mixture of gasoline and oil to clean and polish the floors. The pilot light of the hot water heater was on in an adjoining room. The vapors given off by the gasoline and oil mixture penetrated to the other room and were ignited by the pilot light. The woman was severely burned and the house was damaged.

2. Two girls were washing some silk dresses in a mixture of gasoline, and a friction spark created by rubbing the silk set off the vapors from the gasoline. The girls were enveloped in the resulting fire and both died as a result of the injuries sustained.

3. A small boy was attempting to burn leaves and trash he had raked up in the yard. The fire did not burn readily because the trash and leaves were damp. When he poured some gasoline from a can in the garage and threw it on the fire to speed it up, there was a quick flare-back which caught his clothing on fire and he was burned to death.

Some Safe Practices

It is impossible to enumerate all of the steps which should be followed to avoid these hazards, and the use of good common sense is the first essential, but by enumerating a few safe practices to follow, we perhaps can influence some to remedy these accident causing conditions.

1. Gasoline should never be stored in large quantities around the house or the garage.

2. If it is kept on the premises, it should be stored in a self-closing can that is properly labeled.

3. Never under any circumstances permit gasoline to be used for cleaning purposes. It is manufactured and sold as a fuel and not as a cleaning agent.

4. Do not place oily rags or mops in closets or other closed places. They will ignite from spontaneous combustion.

5. Do not attempt to speed up a fire, either in a fire place or in the open, by the use of kerosine or gasoline.

6. Remember that both gasoline and kerosine readily give off vapors under atmospheric temperatures and all sources of ignition should be kept away when such fluids are being poured, handled or stored.

7. Many cleaning fluids are highly inflammable. The containers are usually so marked and where this condition exists, keep them away from sparks and fires.

Ratable Take Plan

Despite a temporary injunction and further impending court action against the Texas Railroad Commission's ratable take order for the Carthage field, this system of prorating gas from wells in the North Louise field of Wharton County was instituted last week by the commission.

Principal production in the field comes from three wells completed in a sand at 4100 feet.

Barges Offered

The Maritime Commission is offering 32 DPC inland barges for sale at a fixed price of $5000 each. The vessels, 230 by 45 by 11 feet, with a capacity of approximately 46,000 barrels are located in Madisonville, La., where they may be inspected.

DISTRIBUTION SYSTEMS and Surface Injection Equipment in Secondary Recovery

By C. H. KEPLINGER
Kepler and Wanemacher, Tulsa

(This paper is a part of a group being sponsored by the standing Subcommittee on Secondary-Recovery Methods of The American Petroleum Institute. The committee is developing these papers to cover all phases of secondary-recovery projects. This paper considers some of the important factors for the design of surface distribution systems, and it is hoped that the information can be used by practical oil operators.)

CONSIDERATION has been given to distribution systems and well-injection equipment for secondary recovery of oil by air, gas, and water. Economical distribution systems may be designed on a sound engineering basis if the important factors such as volumes, pressures, and expected life of proposed projects are accurately estimated. Standard surface well-injection equipment may be varied to meet local conditions. Individual well meter equipment should be provided for every project.

C. H. Keplinger

(Presented before the Division of Production at the 26th annual meeting of the American Petroleum Institute in the Stevens Hotel, Chicago, November 12, 1946.)

FROM the preliminary survey of a property for secondary-recovery operations or from pilot-plant operation, the primary factors which are considered in the surface system distribution design are determined. The most important of these are as follows:

1. The volume of gas or air or water which must be handled at the various points through the distribution system: The maximum efficient volume should be the governing factor in calculating the most economical design for a given secondary repressuring project. The selection of the proper input volumes throughout the contemplated life of the project should be accurately estimated before the distribution system is designed. For a more detailed treatment of this subject, the reader is referred to Jo H. Cable's paper in American Petroleum Institute's "Supplement to Secondary Recovery of Oil in the United States."[1]

2. The pressure which will be necessary to inject the most efficient volume into the producing formation must be estimated. Possible variations in the pressure requirements throughout the life of the repressuring program should be considered. The designer of the system should take into account the maximum pressures which will be experienced to insure efficient operations.

3. The area that will be handled by a distribution system should be closely approximated, and all possible extensions considered in the original design. The location of the injection wells and their spacing pattern should be determined and made available to the designer of the distribution system, in order for him to determine the length and volume requirements of the various distribution lines.

4. The location of the repressuring plant should be selected on the basis of topography, well distribution, and availability to water or gas supply.

5. Some estimate of the life and rate of return of investment of a secondary-recovery project should be made. On projects which are expected to last a long time, it is possible to design the lines so as to reduce frictional loss throughout the distribution system. The increase in installation cost resulting from larger pipe is justified because of the effected reduction in operating costs.

After the foregoing factors have been determined, it is advisable to prepare a map of the area to be operated under secondary recovery. The volume and pressures which are estimated at the various injection wells should be shown. From the basic information the mechanical design may be made from known engineering formula. To facilitate calculations, the designer may use especially prepared charts and nomographs. Under uniform operating pressures, only one distribution system may be installed. However, with some projects having varying operating pressures, due to variable reservoir conditions, or to operation in multiple sands in the re-

TABLE 1

Flow Table—Water. Approximate line-pipe capacities for lease work.

DELIVERY REQUIRED			PRESSURE LOSS PER 1,000 FEET OF LINE AND HORSEPOWER REQUIRED															
			NOMINAL PIPE SIZE*															
			1½-Inch		2-Inch		2½-Inch		3-Inch		3½-Inch		4-Inch		5-Inch		6-Inch	
Barrels Per Hour	Barrels Per Day (24 Hours)	Gallons Per Minute	PSI	Horse-power	PSI	Horse-power	PSI	Horse-power	PSI	Horse-power	PSI	Horse-power	PSI	Horse-power	PSI	Horse-power	PSI	Horse-power
10	240	7	2.25	0.011	0.667	0.003	0.279	0.001	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	480	14	8.10	0.08	2.41	0.023	1.02	0.009	0.348	0.003	0.172	0.002	.....	.....	.....	.....	.....	.....
30	720	21	17.15	0.25	5.10	0.073	2.13	0.031	0.737	0.011	0.365	0.005	0.197	0.003	.....	.....	.....	.....
40	960	28	29.2	0.56	8.70	0.167	3.63	0.069	1.26	0.024	0.622	0.012	0.337	0.006	0.112	0.002	.....	.....
50	1,200	35	44.2	1.06	13.15	0.315	5.48	0.131	1.90	0.046	0.94	0.023	0.509	0.012	0.169	0.004	.....	.....
60	1,440	42	62.0	1.79	18.4	0.530	7.70	0.220	2.66	0.077	1.32	0.038	0.714	0.020	0.237	0.007	0.098	0.003
70	1,680	49	82.5	2.77	24.5	0.820	10.24	0.344	3.54	0.119	1.75	0.059	0.948	0.032	0.316	0.011	0.130	0.004
80	1,920	56	.....	.....	31.4	1.21	13.10	0.503	4.53	0.174	2.29	0.088	1.22	0.047	0.404	0.016	0.166	0.006
90	2,160	63	.....	.....	39.0	1.68	16.30	0.704	5.56	0.240	2.79	0.121	1.51	0.065	0.504	0.022	0.207	0.009
100	2,400	70	.....	.....	47.2	2.27	19.80	0.950	6.87	0.330	3.39	0.163	1.84	0.088	0.610	0.029	0.252	0.012
150	3,600	105	.....	.....	.....	.....	42.00	3.02	14.50	1.04	7.20	0.518	3.89	0.280	1.29	0.093	0.534	0.038
200	4,800	140	.....	.....	.....	.....	71.20	6.84	24.75	2.37	12.25	1.18	6.63	0.636	2.20	0.211	0.909	0.087
400	9,600	280	.....	.....	.....	.....	.....	.....	89.0	17.09	44.20	8.49	23.9	4.59	7.95	1.53	3.28	0.630
600	14,400	420	.....	.....	.....	.....	.....	.....	.....	.....	93.60	26.96	50.8	14.63	16.9	4.87	6.96	2.00

*Calculations based on actual internal diameters of standard-weight threaded line pipe.

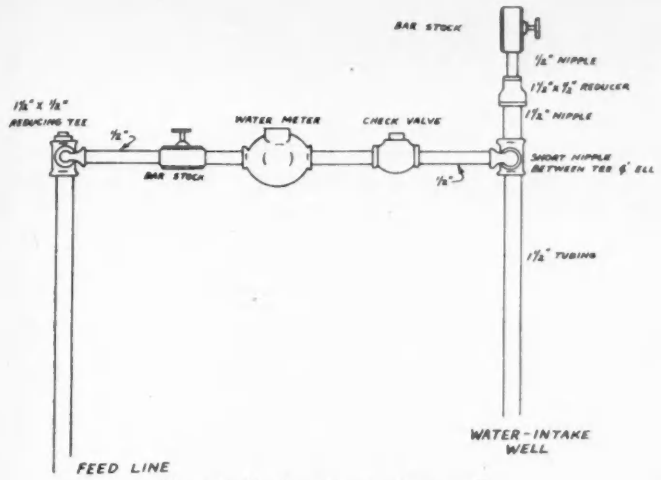


Figure 1. Hookup of water-input well.

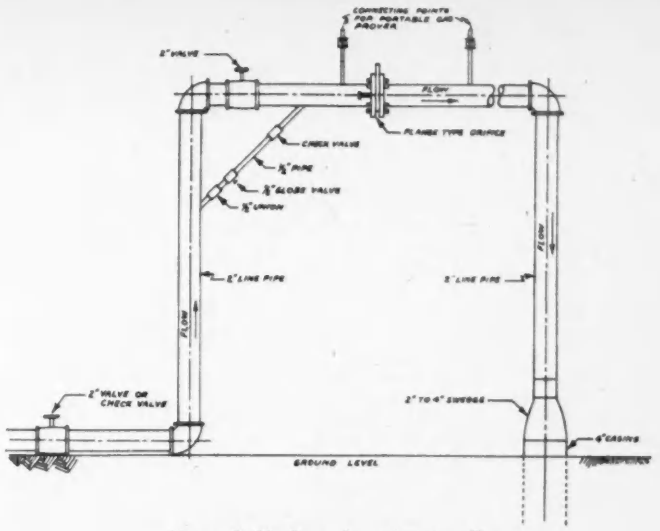


Figure 3. Hookup of gas-input well.

spective wells, it might prove more economical to install high- and low-pressure surface distribution systems.

Formula

For calculating the flow of gas or air, Weymouth's formula or some modification is usually used. Extensive field tests have proved its reliability. The formula follows:

$$Q = 15{,}322.47\left[\frac{(P_1^2 - P_2^2)d^{\frac{5}{3}}}{GTL}\right]^{\frac{1}{2}}$$

Where:

Q = Flow in cubic feet per day at 60 deg. F. and 14.7 psi, absolute.
P_1 = Initial pressure, psi, absolute.
P_2 = Final pressure, psi, absolute.
d = Pipe diameter, in.
G = Specific gravity of gas or air.
L = Length of line, miles.
T = Absolute temperature of gas, deg. F.

The foregoing formula may be used to determine pressure drops, when volumes are known, by transposing the factors in the formula other than pressure to the left-hand side. It is usually advisable to use nomographs based on the Weymouth formula for expediting the calculations. These are available in several handbooks on natural-gas transmission.

In water-flooding operations, the calculation of the flow through pipes of varying diameter is made by using the Hazen-Williams formula. This formula is as follows:

$$V = 1.318cR^{0.63}S^{0.54}$$

Where:

V = Mean velocity, feet per second.
R = Hydraulic radius, for circular pipes, diameter in feet divided by 4.
S = Sine of slope of hydraulic gradient equivalent to pressure head in feet of water, feet per foot.
c = Coefficient, depending on roughness of pipe, varies between 100 and 140.

Table 1 gives pressure loss per thousand feet of line for varying delivery rates. In addition, the table also indicates the horsepower required at various delivery rates. The power requirements make it possible to study the economics of pumping through different pipe sizes.

Installation Factors

The distribution system in most common use is the loop system, with individual lateral lines running to the injection wells. This type of installation offers lower initial investment cost. Fan or radial main feeder lines from a centrally located plant with individual lateral lines to the injection wells have proven most economical in some fields. The shape of the area to be repressured is the determining factor. In small projects individual lines from the repressuring plant have been used with success, and offer the possibility of central metering and control, with a resultant savings in operating cost. The size of the distribution lines is selected to provide for a minimum pressure drop between the plant and the injection well.

In the case of air or gas operations, the gases should be after-cooled to remove gasoline and moisture in order to prevent their condensation in field lines. Dehydration equipment is usually installed on the larger projects. It is good practice to place drips at advantageous locations, low places in the distribution system line, especially for cold-weather operations. These drips when properly designed also act as scale accumulators, and serve an additional purpose in keeping pipe scale and foreign matter from obstructing meter operation, or getting into the injection well and plugging the producing horizon. Distribution lines are usually buried below plow depth in farming country. This practice provides insulation and keeps higher temperature throughout the distribution system. If the soil is corrosive, the lines are painted with asphalt or a coal-tar product, and sometimes wrapped. Internal-line corrosion may be minimized by purifying corrosive gases. In the case of water floods, cement-lined pipe may be used if the injection waters are corrosive.

The cost of a distribution system depends on the cost of pipe and the cost of ditching, laying, and backfilling. In a given area, the going price can readily be determined for the cost of ditching, laying, and backfilling. The contractors for this type of work generally have a fixed charge, depending on soil conditions and the depth to which the pipe must be laid. This cost will vary from 10 cents a foot for two-inch to 40 cents a foot for eight-inch pipe. The cost of the pipe will depend upon whether the pipe is threaded or beveled for welding. It is usually cheaper to use beveled pipe and weld the lines. This has an additional advantage, in that there is less likelihood of leaks when the line is properly welded.

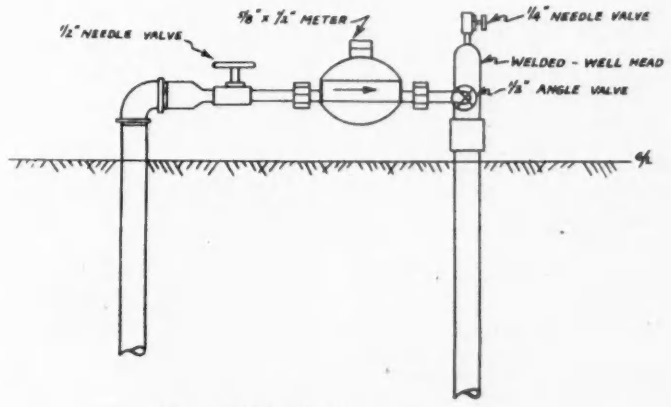


Figure 2. Water-flooding well connections.

Surface Injection Equipment—Water Flooding

Surface injection equipment varies from field to field, but usually contains the essential features of a water-recording meter and necessary well-head fittings and valves for proper operations. A common hookup in the Bradford field, Pennsylvania (furnished by Parke A. Dickey), is as follows (see Figure 1): The lateral water lines are buried. A few feet from the well a riser connec-

tion is set vertically. A reducing tee with ½-inch outlet and a two-inch plug is set on the end of the riser. A horizontal ½-inch nipple is connected to a displacement meter of the rotating-disc type through a union on each side of the meter. From the outlet of the meter is another nipple connecting to a ½-inch check valve, and to another reducing tee on the two-inch well tubing. The upper end of the tee contains a two-inch by ½-inch bushing, to which is connected a petcock for taking pressure readings and blowing back the well.

This well hookup is shown in Figure 1. The purpose of the check valve is to prevent the wells from back-flowing during periods of plant shutdown. On an old flood where leaks occur frequently, the plant may be down many hours a week. If the wells are allowed to back-flow during this period, there is a great loss in reservoir pressure and a corresponding loss in production rate. Certain companies do not leave the meters on the well, but put a nipple in the meter union. Every so often, or at regular intervals, a meter is installed for a day or so, and the rate taken. Recently rotameters have been used for this purpose. Another company installs one meter on a common line to a group of five to ten wells, and takes daily readings. However, the permanent installation of meters provides the only continuous check on the performance of the wells, and they are generally considered a wise investment toward attaining the best results.

Surface Connections

The details of surface connections, as used in a water flood in the new Albany field, Kansas (furnished by N. E. Maxwell, Cities Service Company), are shown in Figure 2. This is an extremely simple installation requiring a minimum of connections to make and keep in repair. The connections are placed close to the ground, so that only a small frost box is needed to protect it from freezing.

Other surface well connections for water flooding, which were studied, had the same general features shown in Figure 1 and 2. It is possible that, when the water is scale-forming or contains suspended matter, it would be advisable to install a filter at the well before the meter. In the Cabin Creek pool of Kanawha County, West Virginia, a filter is provided on all injection wells. Additional description of this equipment is contained in the API paper entitled "Water Injection in the Cabin Creek Field, West Virginia," by C. F. Terrell.[2]

Several operators with experience in water flooding have recommended the installation of a permanent meter at all injection wells. It has been their experience, if the well water used for flooding purposes is metered regularly, that it will be possible to determine whether the well has leaky tubing or casing. If there is a small leak, which gradually grows larger and larger, the meter readings from day to day will show this increase in quantity of water going into the well, and will be helpful in determining when well repairs should be made.

For gas injection, the surface hookup should include a drip, orifice meter, check valve, and well-head connections to allow for periodic blowing of the well to remove scale. In all projects which have considerable volume of air mixed with the gas, it is very important that the drips be designed so as to provide for the blowing of line scale through the lines. Figure 3 shows a typical low-pressure gas-injection hookup, which is used in the Mid-Continent area.

For multiple-zone injection in the same well, suitable well-head connections are provided, and separate meters should be provided for each zone. In some areas it is desirable to arrange the surface equipment so that the fluid in the well may be removed by swabbing or gas lift before an attempt is made to inject gas into the formation.

Conclusion

In conclusion, the designer of surface distribution systems should strive to provide for installations which will be permanent throughout the life of the project and which will be economical. It is usually better to place in operation an injection system which will serve the ultimate purpose, rather than to install a temporary system which will have to be redesigned from time to time. The surface hookup for a water-injection or gas-injection well should be as simple as possible.

Acknowledgment

Appreciative acknowledgment is made to the committee members who have generously furnished descriptions of standard well connections and meter installations used in gas-injection and water-flooding operations through the oil-producing areas of the United States.

References

[1] J. H. Cable, "Preliminary Field Tests for Determining Required Injection Volumes and Pressures," Proc. API 24 [IV] 147-50 (1945); also Supplement to Secondary Recovery of Oil in the United States, 147-50 (1942).

[2] C. F. Terrell, "Water Injection in the Cabin Creek Field, West Virginia," Drilling and Production Practice, 77-83, American Petroleum Institute (1945).

Patent Roundup

A Regular Feature of THE OIL WEEKLY

In this column are reviewed patents dealing with drilling, producing and pipe line branches of the oil industry that are issued by the United States Patent Office.

PATENTS recently issued by the United States Patent Office, Washington, D. C., include those listed below.

Printed copies of the patents listed are furnished by the Patent Office for 25 cents per copy and can be had by addressing the Commissioner of Patents, Washington 25, D. C.

Seismic Surveying

This apparatus for use in sesimic surveying (No. 2,410,303) has been patented by Olive S. Petty, San Antonio.

In combination with a seismometer for converting incoming seismic energy into electrical waveform signals, is a means for amplifying and recording such signals, which has a device for initiating the operation of a means responsive to an increase in signal energy above a predetermined level for decreasing the gain of the amplifying means.

Pipe Joining Device

This patent (No. 2,409,865) issued to Howard W. Jewell, Los Angeles, is unassigned.

The pipe joint of two plain end pipe sections of preferably uniform inside diameter and axially aligned is held by a hollow sleeve comprising a material, rapidly disintegrable by the action of a liquid, having a beaded and thickened midportion with the bead extending partway between and separating the ends of the pipes. The sleeve ends taper inwardly from the bead to a position spaced from the inside wall of the pipe and are adapted to trap liquid between the sleeve and pipe wall that promotes disintegration of the sleeve. The ends of the pipe adjacent the joint are surrounded by a layer of sealing cement which extends between the abutted ends of the pipe to a position initially in contact with the bead on the sleeve.

Treatment of Oil Wells

John E. Munn, Bellevue, Pa., has assigned this patent (No. 2,402,433) for treatment of oil wells to Chemical Service Company, Pittsburgh.

In treating oil wells in which water is present a liquid capable of reducing the surface tension of water is forced into the oil-producing stratum below the bottom of the well. A second liquid consisting essentially of carbon tetrachloride is introduced into the same portion of the stratum to displace the water treated with the first liquid. Thereafter, the bottom of the well is sealed below a given oil producing level against the upflow of liquid.

Determining Formation Permeability

This patent (No. 2,409,674) is used in logging a well penetrating formations having sufficient permeability to allow sufficient amounts of liquid to be forced therein, and was issued to Joseph W. Graybeal, Midland, Texas, assignor to Standard Oil Development Company.

A body of liquid is forced into the bore of the well, and portions of the liquid into a plurality of formations, the remainder of the liquid sent down through the well. The rate at which a portion of the liquid is forced into a selected formation is determined, simultaneously with the determining of the shut-in pressure in the well adjacent to the face of the formation.

Apparatus for Well Logging

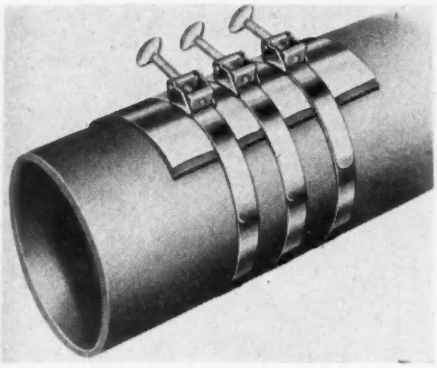
This apparatus patented (No. 2,398,-562) by William L. Russell, Tulsa, is a surveying device for recording characteristics of the well's formations, and is a caliper tool to be lowered into the hole which has pairs of adjacent arms mounted for independent movement in radial planes extending through the axis of the well. These arms have blunt and sharp contact portions adapted to contact contiguous areas of the well wall, engaging the surface of the formations. A mechanism connected with the arms records the relative movements thereof.

NEW EQUIPMENT LITERATURE

For additional information, use mailing card inserted opposite this page

1—Clamp

A new stainless steel pipe-leak clamp recently has been tested without leaking at pressures exceeding 240 pounds per square inch. The clamp consists of a Hycar pad which is resistant to deterio-



ration by water, gas, oil and gasoline.

An annealed backing plate covers the pad and can be hand-formed to the desired pipe contour. The pad and patch plate are secured over the lead with stainless steel clamps of the continuous band type which have a size range from 9/16-inch up to the maximum diameter for the clamp. Such a combination is said to possess high strength and corrosion resistance. Use of one pipe-leak clamp for numerous size pipes facilitates stopping leaks promptly. Six sizes are available to fit all pipe diameters from ½-inch to 12 inches. Sizes over 12 inches are available.

Manufactured by Marman Products Company, Inc., Inglewood, Calif.

(Check item 1 on postcard for more information.)

2—Regulators

The entire line of Rockwell-Emco appliance regulators for commercial, industrial and domestic uses has undergone a complete redesign. The bodies and covers of the new regulators are

pressure cast from a special aluminum alloy which reduces weight. All sizes, ranging from ½, ¾, 1 and 1¼-inches, follow the same design which is said to offer a minimum of friction to the gas flow. The ½-inch size is equipped with an inlet on the bottom of the regulator as well as the side opening.

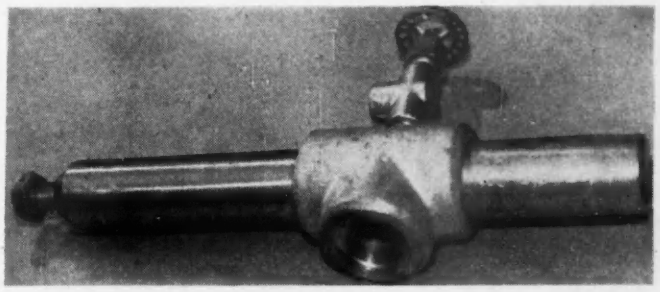
At a pressure drop 0.5 inch (Hg). the volume of gas (0.6 specific gravity) varies from 187 cubic feet per hour for the ½-inch size to 1000 cubic feet per hour for the ¼-inch size. Provision has been made, in case heavy pressure surges rupture the diaphragm, to minimize the leakage to an amount not normally considered hazardous. This device is known as the Emcovent, which is essentially an orifice to limit the passage of gas through a vent so the gas may be detected.

Manufactured by Pittsburgh Equitable Meter Division, Rockwell Manufacturing Company, Pittsburgh 8.

(Check item 2 on postcard for more information.)

3—Safety Valve

The velocity of line fluids on a cone-shaped valve stem operates a unique safety valve. It is designed for installation on flow lines or pipe lines and forms simple and inexpensive means to control pressures in the event a break occurs in the line. Its use is claimed to eliminate fire hazards, damage to crops and buildings, contamination of streams and production losses due to line breaks.



The valve is set by means of one screw adjustment to pass fluids at a predetermined velocity. If the pressure drop across the valve suddenly increases, as would happen in a line break, the increase in flow rate, or increase in fluid velocity past the cone valve stem will pull the stem into the seat and close the valve.

Sensitivity of the valve may be adjusted so closure may be effected if the pressure drop across the valve exceeds the desired value by two or three pounds, or as high as the operator requires. Reopening the safety valve must be done manually to insure that flow will not be resumed until desired. All internal parts are cadmium steel in the alloy steel models. A variety of sizes is available. Manufactured by Oilfield Machine and Supply Company, Box 2172, Houston.

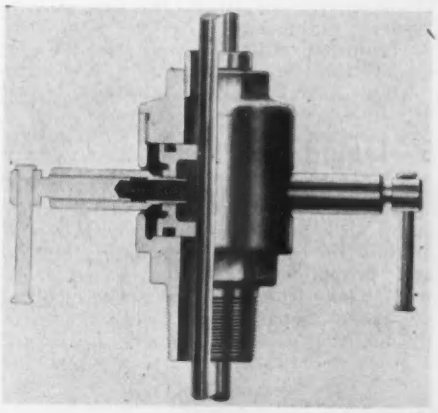
(Check item 3 on postcard for more information.)

4—Stuffing Box

A floating gland provides true self-alignment in the new Type C polished rod stuffing box. Self-lubricated plastic packing, developed for the purpose, is said to maintain a positive fluid and pressure seal around the polished rod under severe conditions.

The gland, which "floats" with the rod, seats on a shoulder inside a housing and is held in position vertically by a threaded cap screwed in the top of the housing. O-Rings in the gland effect a pressure seal between the gland and housing, so that all fluid and pressure is confined to the inside of the gland.

Plastic guns, threaded into the gland, extend through the housing and permit plastic to be inserted, tightened and added as necessary, without shutting in the well. The plastic guns are not connected to the housing in any manner. They extend through large openings in the housing and are free to move with the gland as it floats to compensate for any off-center movement of the polished rod. A bronze wear bushing, screwed in



the top of the cap, limits lateral movement of the rod, preventing contact with the tubing and fittings and eliminating wear on the gland.

Type C polished rod stuffing boxes are available with 2½-inch lower connections, for all popular sizes of polished rods. They are designed for working pressures up to 500 pounds per square inch.

Manufactured by Kinzbach Tool Company, Inc., P. O. Box 312, Houston.

(Check item 4 on postcard for more information.)

5—Blowoff Valve

A remote-controlled blowoff valve for oil field use, which can be operated by the fireman while watching his boiler gauge, has been announced. Major features of the valve include (1) one-piece

construction of disc and stem to prevent leakage which might otherwise result from the disc jarring loose from the stem, and (2) protection of the valve

stem and gland due to the position of the external stop which limits the movement of the operating handle when the valve is jerked open.

Other features embodied in the design of this valve, No. 6400-400 WP, include a readily-reversible seat, clamped between bonnets and requiring no tools for its removal; and a bolted-type stuffing box to eliminate the danger of thread damage. The reversible seat consists of S-monel, while the one-piece disc and 7/8-inch stem are of monel metal. The seat and gasket of the valve are held between two bonnets in such a way as to prevent distortion of the seat and to assure a tight seal.

Manufactured by Everlasting Valve Co., 49 Fisk St., Jersey City 5, N. J.

(Check item 5 on postcard for more information.)

6—Liquid Line Head

A new liquid line head has been designed, manufactured and tested to withstand high pressures and provide a safe method for filling and evacuating butane and propane liquids and gases from truck tanks to engine fuel tanks or storage tanks. Separated by permanent partitions, the vapor chamber and liquid chambers are fully protected against any chance of liquid getting into the fuel line or vapor into the liquid withdrawal line. The body of the liquid line head is brass, 5/16-inch thick, with outlets which permit the attachment of a compact fittings hook-up.

Extended from the liquid chamber to the bottom of the tank, a ¾-inch pipe affords a means for safely filling the system, mixing or withdrawing liquid in the shortest possible time. Openings are provided for filler valve, hand liquid valve, hand vapor valve, vapor return valve and pressure gauge. The manifold was so designed that in case of emergency the liquid may be withdrawn from the system to the truck tank through the filler valve without having to release the contents into the atmosphere.

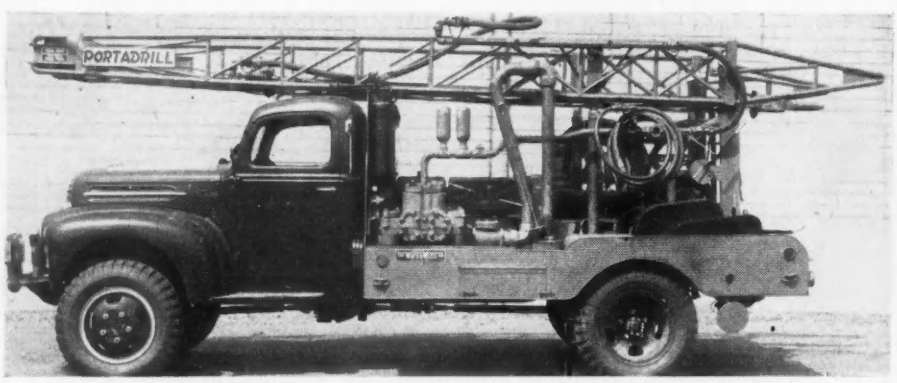
Manufacured by McNamar Boiler & Tank Co., P. O. Box 858, Tulsa 1.

(Check item 6 on postcard for more information.)

7—Portable Drilling Rig

The portable drilling rig illustrated is capable of drilling an eight-inch hole 1000 feet deep, and smaller holes to considerably greater depths. Called "Portadrill," the unit, minus the truck, weighs approximately 11,000 pounds.

Constructed of alloy materials for durability, the new drilling unit is designed for speed in geophysical work and core drilling. The 22-foot mast is of welded tubular steel and is raised into position by two hydraulic, telescoping displacement type rams. Sheaves of the crown block are mounted at an angle which diverges at the rear so as to lead down to the two drums, and converge at the front over the turntable to prevent the cable from slipping off the sheaves.



All control handles are conveniently grouped at the rear to simplify the work of the operator and give quick, positive control over all operations. The 4½- by six-inch mud pump is a Gardner-Denver FG-FXG with spiral valves and inserts added to increase the volumetric capacity. The power takeoff is of the split shaft type suitable for either a standard or four-wheel drive truck. The rotary is of alloy steel and incorporates heavy-duty Timken bearings and a standard 1½-ton truck ring gear and pinion. It is easily removed to permit setting oversized casing. Standard size of the table opening is five inches square. The Portadrill may be equipped with flood lights for night work. Standard installation consists of an auxiliary battery of 150 amperes output, six floodlights, and a 40-ampere generator driven off the power shaft.

Manufactured by The Winter Weiss Company, 2201 Blake Street, Denver 2.

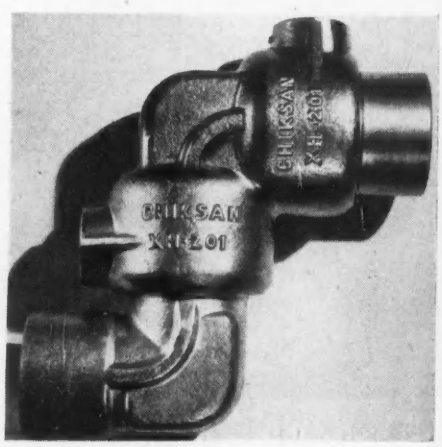
(Check item 7 on postcard for more information.)

8—Swivel Joint

A swivel joint that handles high pressures is the XH extra high-pressure swivel joint which features low torque and positive packing sealoff. Rotating members are steel forgings, machined to close tolerances and with flame-hardened ball races. Full 360-degree rotation with low torque occurs on two rows of hardened steel balls which also serve to hold the rotating members together under pre-regulated pressure.

The packing element is specially designed for high pressure service, and is self-adjusting. The new type XH employs no bolted flanges, locking rings or stuffing boxes, requiring nothing to be tightened or adjusted. High pressure lubricating fittings provide positive lubrication of the bearings. Inside diameter is unobstructed to permit full flow of liquids, gases and vapors with minimum friction loss and turbulence. The end connections are of the high-pressure taper thread type.

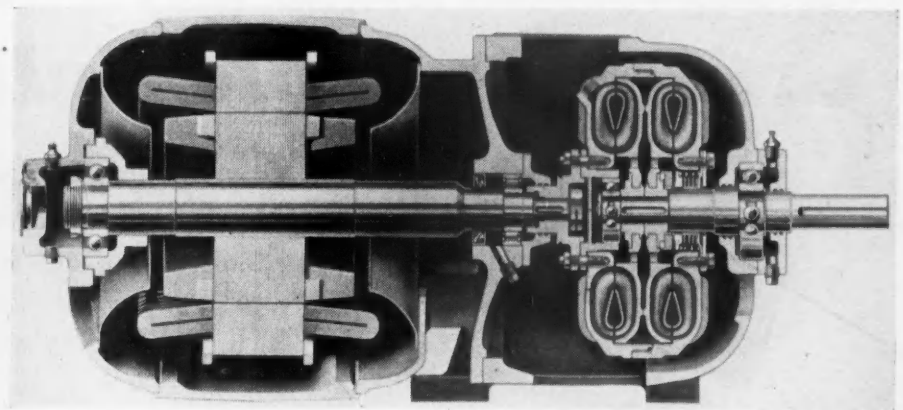
Manufactured by Chiksan Company, Brea, Calif.



(Check item 8 on postcard for more information.)

9—Electrofluid Drive

The electrofluid drive is a compact, hydraulic combination consisting of a general-purpose A. C. induction motor flange-mounted on a sturdy housing containing a hydraulic coupling. The output shaft may be direct-connected to the driven machine or to a speed reducer unit. It may also be connected to the driven machine through the medium of chain, gear or belt drives.



The primary element of the hydraulic coupling is similar to a centrifugal pump impeller, and the secondary element, or output element, is like a water-wheel or runner. The runner is rotated through the medium of a light mineral oil which flows through the runner buckets back to the impeller. In this manner, it serves as an automatic clutch, with the fluid acting as a "cushion." The electrofluid drive is claimed to have successfully solved the problem of inadequate torque and excessive high starting current peaks. Regardless of the characteristics or inertia of the driven machine, or connected load, the motor starts at no-load, because at zero speed the torque transmitting capacity of the fluid coupling is zero.

Manufactured by Link-Belt Company, 307 N. Michigan Ave., Chicago 1.

(Check item 9 on postcard for more information.)

10—Block and Hook

Conservatively rated at a capacity of 45 tons is this unitized block and hook which is compact and streamline in design. Its overall height is 48 inches, while its thickness is ten inches. One or two 24-inch diameter sheaves can be furnished with the block. Lines may be reeved without disconnecting the hook by simply opening the block through removal of the guards and one pin.

The load is carried in perfect balance to avoid off-center strains, it is claimed. The symmetrical streamlined body has no protruding bolts or sections to hang up or cause trouble. The hook may swivel or be locked in any one of eight positions. A proportional part of the load is carried by the hook link, which is said to eliminate flexing and fatigue of the hook under repeated heavy loads. The hook link is securely locked when closed. Manufactured by The Guiberson Corporation, Box 1106, Dallas.

(Check item 10 on postcard for more information.)

Literature

11—Diesel Engines

A 64-page General Catalog, printed in four colors and in pocket size, gives detailed descriptions of five series of Cummins Diesel engines. Series H, Series HS, Series NH, Series NHS and Series L. In each series, except Series L, Cummins makes a wide range of models specifically designed for industrial, automotive and marine use. Power ranges are from 84 to 275 horsepower.

Published by Cummins Engine Co., Inc., Columbus, Ind.

(Check item 11 on postcard for more information.)

12—Engines

"Red Seal Engines" is the title of a new booklet describing and illustrating oil field engines. It is bound in a heavy embossed black paper and is indexed with leaf tabs according to the type of engine. The three-color catalog contains photographs of the various engines, and many featured component parts in addition to black and white dimensional drawings. General specifications of every engine and its associated accessories are described. All engines listed operate on natural gas, butane or gasoline, and vary in size from the 5-10 shaft horsepower continuous duty engine to the 40-105 shaft horsepower continuous duty engine. Issued by Continental Motors Corporation, Water Street, Muskegon, Mich.

(Check item 12 on postcard for more information.)

13—Oil Field Specialties

Booklets have been published giving information, specifications, installation instructions, parts and price lists of oil field specialties. The new booklets may be ordered by number and include the following: Plastic Tubing Protectors, No. 180; Mud Guns, 200; Pipe Wipers, 300; Sucker Rod Wipers, 310; Kelly Wipers, 320; Wire Line Wipers, 330; Deep Well Swabs, 340; Wire Line Guides, 400; Deal-Line Stabilizers, 500; Traveling Block Bumpers, 600; Swivel Bail Bumbers, 650; and the company's General Catalog for 1947 which describes protectors, stabilizers, tools and other items.

Offered by Patterson-Ballagh Division, Byron Jackson Co., 1900 E. 65th St., Los Angeles 1.

(Check item 13 on postcard for more information.)

14—Rig

"Ideal Consolidated Rig Type 50" is the title of an illustrated catalog describing a modern power drilling rig for use in drilling medium-depth wells. Printed in two-colors, the 16-page bulletin is liberally illustrated with photographs showing the rig assembled, its main features and individual parts.

Engineering specifications and operating data are presented with a blue print drawing of top and side views. One full page, 8½ by 11 inches, is devoted to a line drawing on which is shown the various shaft speed ratios.

Published by The National Supply Company, Toledo, Ohio.

(Check item 14 on postcard for more information.)

15—Drilling Equipment

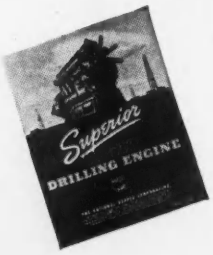
"IDECO Oilfield Equipment and Supplies" is the title of a condensed catalog containing brief descriptions, illustrations and specifications of material and machinery. The 52-page, completely illustrated catalog describes many major items of rotary drilling equipment, such as crown blocks, traveling blocks, cantilever masts, coring reels, derricks, draw works, rotaries, power rigs (Hydrair, PR-500, M-10000, and the PR-1000), triplex slush pumps, swivels, substructures, and utility units. Cable tool equipment sold under the IDECO name is listed, as well as the company's line of production, servicing and miscellaneous equipment. With four-color covers, the catalog is 8¼x11 inches and is punched for loose leaf notebooks.

Published by International Derrick and Equipment Company, Columbus 8, Ohio.

(Check item 15 on postcard for more information.)

Superior

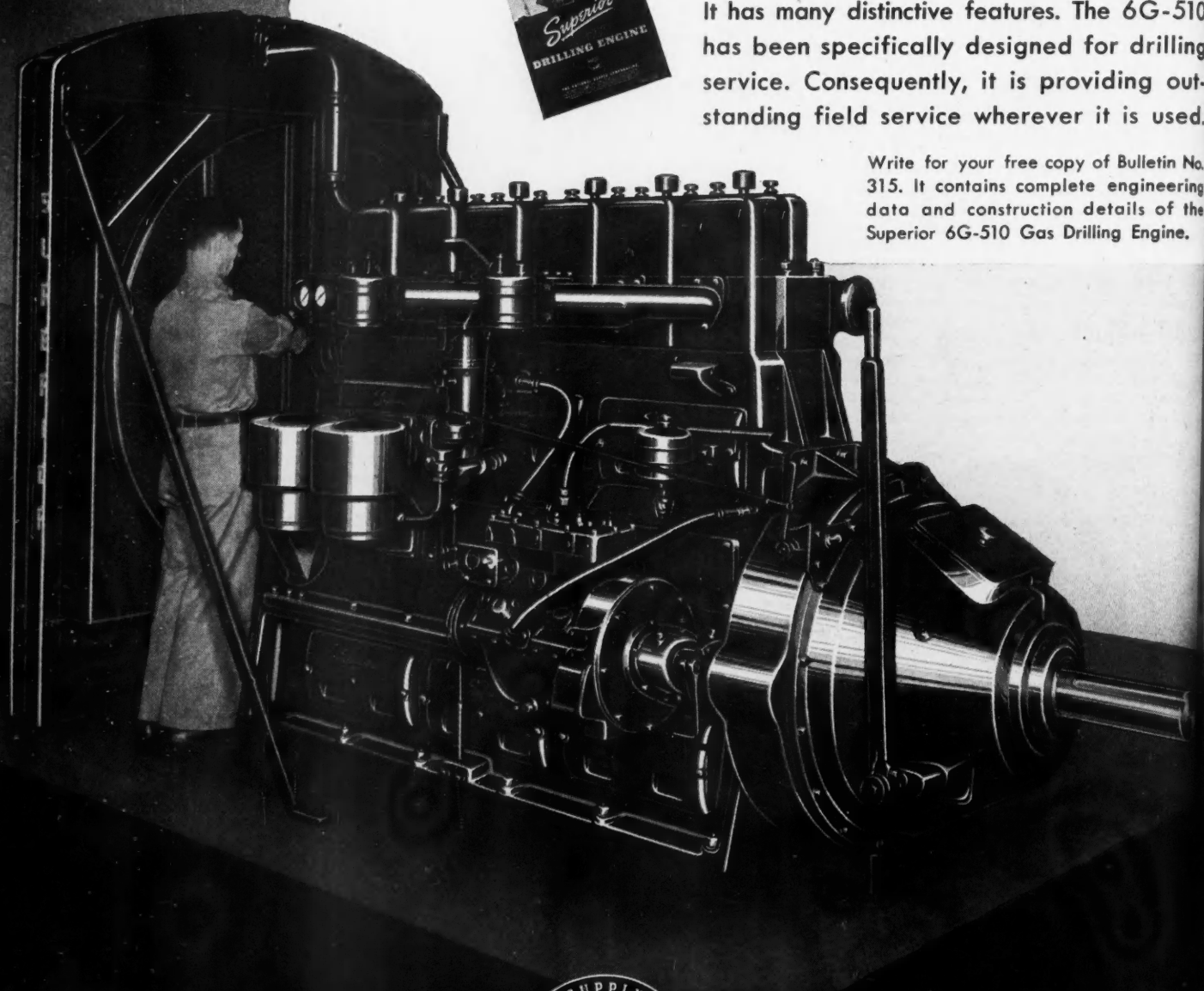
THE 6G-510 GAS ..
... Dependable, full



Superior 6G-510 Gas Drilling Engine

The Superior 6G-510 is a tough, strong engine. It has many distinctive features. The 6G-510 has been specifically designed for drilling service. Consequently, it is providing outstanding field service wherever it is used.

Write for your free copy of Bulletin No. 315. It contains complete engineering data and construction details of the Superior 6G-510 Gas Drilling Engine.



First in Quality — NATIONAL SUPPLY COMPANY NSCO — NATIONAL BLUE PRODUCTS

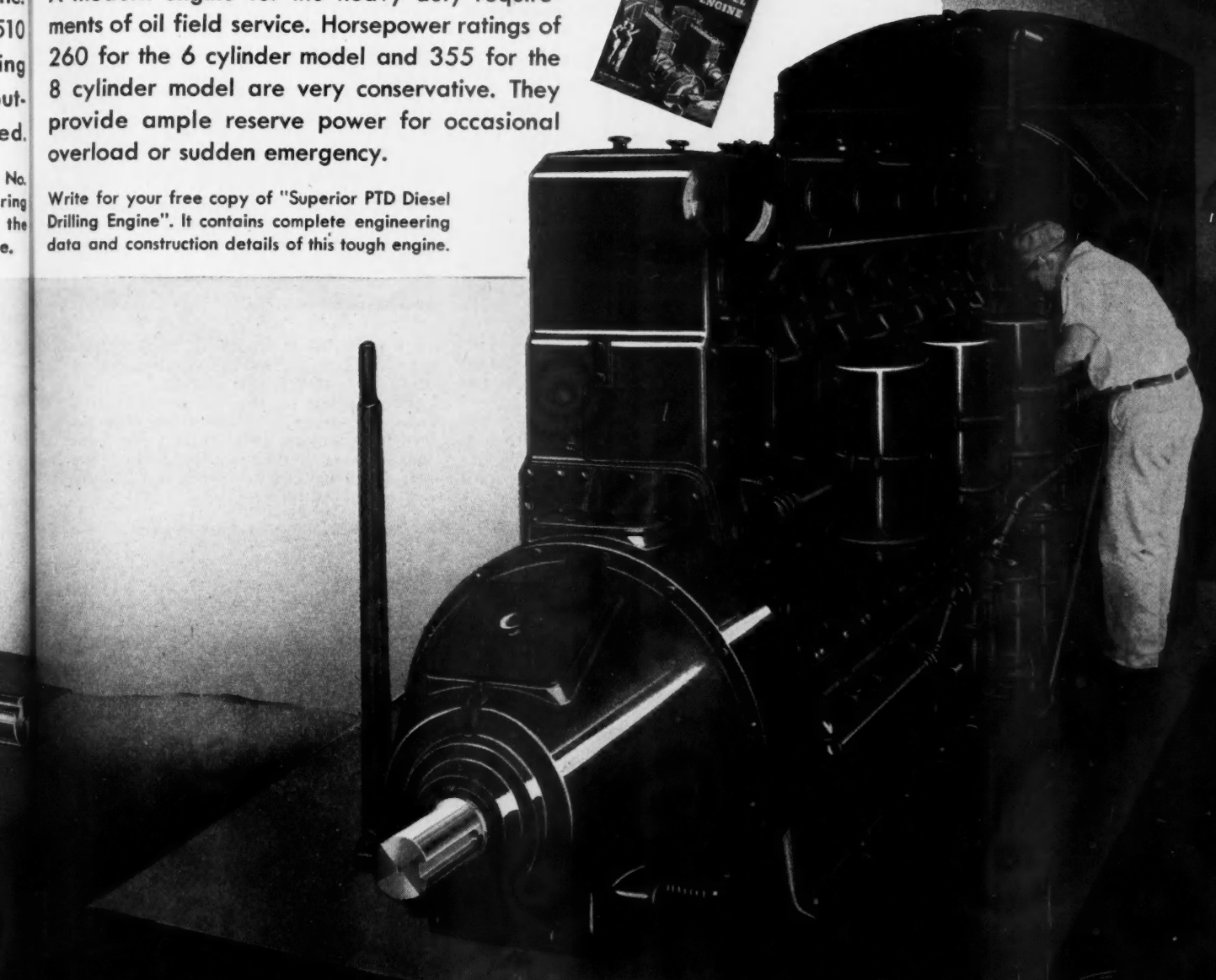
DRILLING ENGINES

THE PTD DIESEL
capacity horsepower

Superior PTD Diesel Drilling Engine

A modern engine for the heavy duty requirements of oil field service. Horsepower ratings of 260 for the 6 cylinder model and 355 for the 8 cylinder model are very conservative. They provide ample reserve power for occasional overload or sudden emergency.

Write for your free copy of "Superior PTD Diesel Drilling Engine". It contains complete engineering data and construction details of this tough engine.

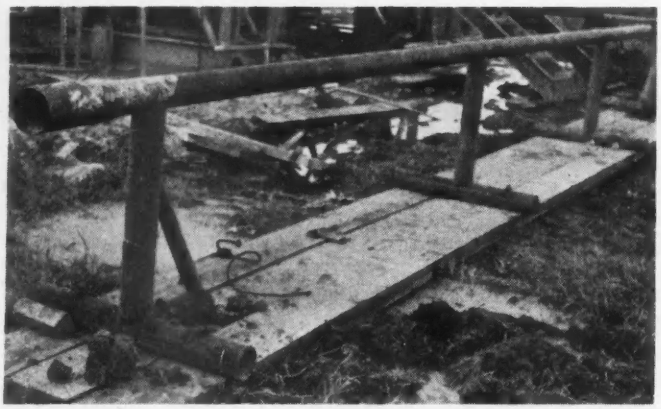


THE NATIONAL SUPPLY COMPANY

GENERAL SALES OFFICES: TOLEDO, OHIO • DIVISION OFFICES: DENVER • FT. WORTH
PITTSBURGH • TULSA • TORRANCE • EXPORT: NATIONAL SUPPLY EXPORT CORPORATION,
30 ROCKERFELLER PLAZA, NEW YORK, N.Y., U.S.A., RIVER PLATE HOUSE, 12 S PLACE, LONDON, E.C. 2.

Pipe Rack Useful at Marshy Locations

PIPE HANDLING



In marshy land, the problem of providing adequate support for the pipe racks at the rig calls for the use of considerable timber cribbing which, if not carefully tied together, is apt to disintegrate under load. One drilling contractor utilizes the familiar welded pipe support for his rack, placing four supports under a joint of salvaged drill pipe. The two end supports are formed with a horizontal T-shaped base, the short "stem" of the "T" being braced to the upright to prevent possible collapse in line with the pipe-supporting member.

Each of the base pieces of the supports is drilled through vertically with ¾-inch holes, and the supports are then bolted to three 3x12-inch timbers, as long as the drill pipe on top of the unit. The timbers then form a continuous base 36 inches in width and as long as the pipe unit, insuring adequate bearing surface to support three tiers of drill pipe, even in the soft muck of a rice field.

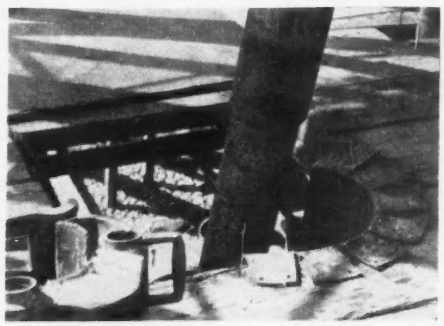
When tearing down a rig, the embedded timber footing is broken free of the ground by attaching a line to the middle of the drill pipe and pulling at right angles to the line of the pipe. The leverage thus obtained tends to revolve the timbers around the edge nearer the pull, loosening the unit with only a fraction of the power required to lift it vertically from its bed in the soft ground.

The pipe and attached timbers are handled as a unit, and may be used in pairs to form side rails or guards between which may be piled pipe and loose timbers.

Metal Flashing at Floor Level Improves Rat Hole

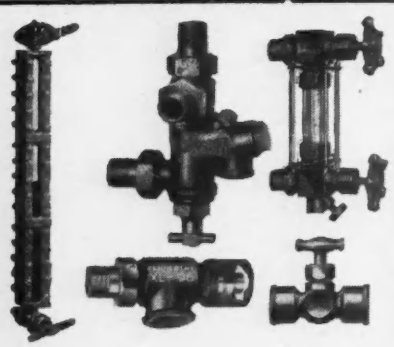
RAT HOLE CONSTRUCTION

In order to eliminate much of the abrasion and scuffing that damages planking surrounding the type of rat hole that is mounted flush with or below the level of the derrick floor, one company has adopted the practice of preparing the top edge of the pipe in the manner illustrated. The upper edge of that portion of the pipe which extends up to the floor is trimmed off so that only some six inches projects above the level of the planking. This projecting edge then is cut into segments, and laid back upon the floor, spikes being driven into holes through the several pieces to securely hold them in place.



Preparation of the rat hole in this manner serves not only to protect wooden planking from injury, but provides a smoother surface over which the kelly and fittings can be slid during drilling operations.

PENBERTHY
QUALITY
PRODUCTS



Penberthy liquid level gages of various types—injectors—ejectors—all so widely used throughout the oil industry because they have always been dependable under the most severe service conditions.

All are of rugged construction and made by an organization with 57 years experience in the manufacture of quality products.

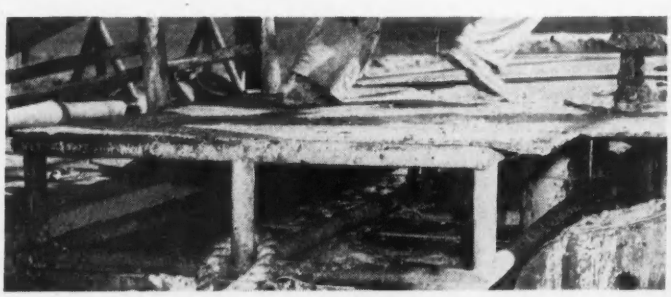
See Pages 2450 to 2455, Composite Catalog

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

Prefabricated Portable Floor Section

RIG FLOORS

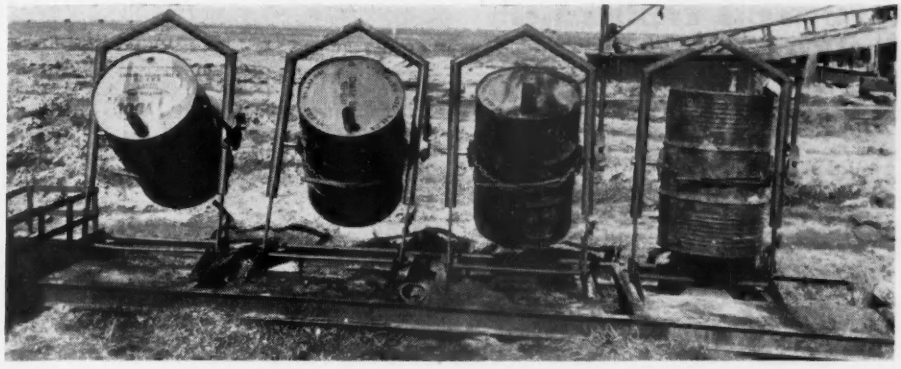
When the rotary table is set on the floor members of the substructure, instead of being placed within a well in the steel beams, it is necessary to build an auxiliary floor at the level of the table to speed up pipe handling and reduce the possibility of accident.



One contractor provides a level working and pipe-racking floor by fabricating a pipe section which, when floored with steel plate, is the proper thickness to level with the table. This skid section is bolted or clamped to the beams through holes in the wood decking, and affords a secure footing which may be hosed down without being made slippery.

When the rotary is to be moved or worked on, the portable section of the floor may readily be shifted out of the way, and the side of the table exposed for convenient contact. The all-welded section is handled on the truck as an auxiliary pipe and material rack, being turned over to rest on the steel plates, with the pipe sides then forming support for material stored on the plate.

Oil Drum Rack Is Unitized and Skid Mounted



MATERIAL HANDLING

Handling the drums in which is stored the supply of lubricants required around the rig may be simplified by the use of special racks for drum storage, and the placing of the full drums reduced to a one-man job through the use of devices which increase the leverage enough to multiply the lifting effort over straight lift. One such unit is illustrated. The pipe supporting frame is pivoted near the base, with a latch which will either hold the yoke at a level where the drum rests on the steel plate deck, or—when elevated—carries the drum high enough to allow it to be tilted without the bottom edge dragging. A spring-actuated latch lever automatically locks the yoke in the vertical position as it is lifted.

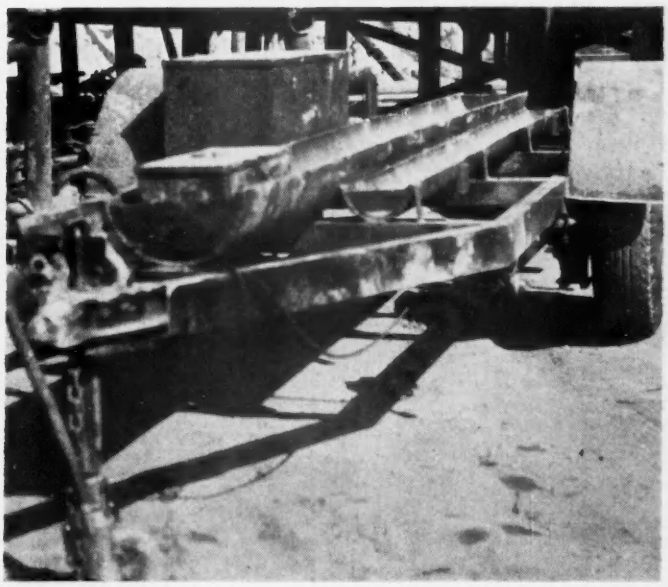
The cradle which carries the drum swings between trunnions, one of which carries a notched locking lever to hold the drum upright, at an angle of 60 degrees, or at 30 degrees. In one of these three positions, depending upon the remaining liquid, it is easy to tilt the drum and to control the oil flow.

To avoid wear on the bung fittings in the drum as oil is drawn, the shipping plug is removed and a 4-inch nipple screwed in its place, and a pipe cap, screwed on handily, serves as dust cover while the contents of a drum are being dispensed.

Light Trailer Speeds Up Delivery of Well Tools

WELL TOOL HANDLING

Whipstocks, knuckle joints and other specialized drilling tools are usually needed in a hurry and time cannot be spent requesting a truck. A trailer can be built especially for such tools with receivers into which they are laid for rapid transportation. A low drop axle is used with disc wheels taking conventional 7.50 x 16 automobile tires. Springing is obtained in the conventional manner. The frame is made of channel iron with sufficient cross members to support the load. Split joints of pipe are welded to the cross members to supply the cradles, or troughs for holding the equipment. The tow-bar is fitted with a conventional ball and socket attachment so that it may be hitched behind a tool pusher's car or truck.



"It won't be long now, boss!

"The boys are really washing her since we ran that Baker Casing Scraper and smoothed up the inside of the casing. We haven't even nicked a swab rubber, which tells me the casing must really be clean!"

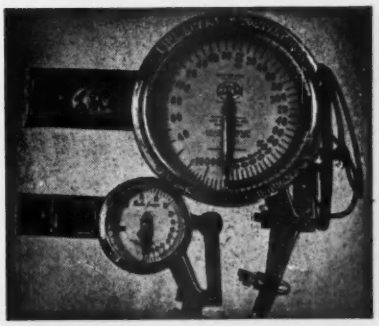
He is right, for a

BAKER CASING SCRAPER

not only removes burrs left from gun perforating but also scrapes off hardened cement, mud, and even mill scale. It is reasonable to rent, and your crews can run it easily.

Call any BAKER office for Service

LINE SCALES



20 MODELS to choose from

(Above) Super 500,000# capacity, 14" dial. (Below) Packer Special, Capacity 40,000#, 6" dial. 18 other models for every drilling, well servicing, or work-over need.

With a Line Scale you know the pull on the line, and the weight on the bit in pounds. Accurate, sensitive, rugged and economical.

Line Scales are dependable, even in areas of rapid temperature changes. Repeated tests prove the accuracy of Line Scale readings under all working conditions.

LINE SCALE CO., Inc.

Phone 2-1765, 907-11 SE 29th St., Box 4245
Oklahoma City, Oklahoma

Stocks of Refinery Products Tapped To Meet Market's Increased Demands

Despite increased production of principal refinery products, stocks were called upon to help meet the market's demands in the week of November 23, according to the latest report of The American Petroleum Institute.

Stocks of the burning oils were withdrawn to satisfy the market's needs as cooler weather became more widespread and the threat of a prolonged coal strike caused many domestic and industrial coal users to switch over to oil burners. In the previous week, demand for gasoline declined and allowed stocks to make a false start toward their seasonal climb, but this week's increased call for motor fuel dropped inventories over one-half million barrels.

Crude production from U. S. fields during the week ended November 23 averaged 4,810,000 barrels daily, an increase of 18,000 a day over the previous week's daily output, and 341,000 barrels or 7.6 percent over the rate of the comparable week of last year.

Runs to refinery stills amounted to 4,621,000 barrels a day during the week, a drop of 95,000 a day from the previous period's runs, but 58,000 barrels or 1.3 percent more than runs of the like week of last year.

Above-ground stocks of refinable crude totaled 221,670,000 barrels November 16, after increasing 368,000 barrels during the preceding seven days, according to the Bureau of Mines. These stocks represented an increase of 1,167,000 barrels or ½ of one percent over the 220,503,000 barrels held November 17, last year.

Gasoline production, including natural blended at the refineries, totaled 15,014,000 barrels during the week of November 23, which was 332,000 barrels more than the previous week's output, but 200,000 barrels or 1.3 percent less than was produced in the like period of 1945. Stocks of finished and unfinished gasoline dropped 561,000 barrels during the week to the new level of 87,446,000 barrels, which is 3,623,000 barrels or 4.3 percent more than was in storage a year ago.

Refinery output of distillate fuel oil totaled 5,609,000 barrels in the week to top the previous week's production by 54,000 barrels and that of last year's week by 904,000 barrels or 19.2 percent.

Some of the industry's observers had become alarmed at the proportions of the vast stockpile of this light fuel that had accumulated, but with the number of changeovers to oil in old burner installations that have been made and those that will be brought on by this and possibly other coal industry tieups, plus installations in new construction, it appears that it will be most fortunate to have this reserve if this winter should prove severe.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod.		Runs to Stills		Crude Stocks		Gasoline Stocks		Gasoil and Distillate Stocks		Residual Fuel Oil Stocks	
	Barrels Daily	Week Ended	Barrels Daily	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended
Highs:												
1941	4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	47,861	11-14	95,857	1- 8
1943	4,436	11-13	4,331	12- 4	245,752	5-29	94,159	3-20	47,187	11-27	72,881	1- 2
1944	4,762	9-30	4,798	12-30	240,992	1- 1	89,162	4- 1	48,162	10-28	64,744	10- 7
1945	4,944	7-21	[1]5,140	8-18	227,554	10-13	99,012	3-24	45,341	11-17	56,074	1- 6
1946	[1]4,961	6-15	4,911	8-31	229,430	3- 2	105,233	2-16	[1]67,286	11- 9	61,636	11- 2
Lows:												
1939	[3]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 3
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,382	4-12	90,914	7-13
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-18	232,191	1- 9	68,182	10-16	30,732	4- 3	57,596	12-25
1944	4,357	1- 1	4,228	2-12	220,258	9- 9	76,302	1- 1	30,232	4-19	49,737	3-18
1945	3,621	10- 6	3,409	10-6	[4]211,813	8-25	70,791	10-13	26,483	3-17	38,548	5-26
1946	4,403	3- 9	4,498	1-12	218,193	1- 5	85,324	9-28	25,131	3- 9	37,289	4- 6

TRENDS OF 1946

Trends in Week Ended	Crude Oil			Gasoline		Gasoil and Distillate		Residual Fuel	
	Production Daily	Runs to Stills Daily	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,293	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,337	28,240	8,738	37,746
April 27	4,672	4,685	224,443	14,228	99,631	5,568	30,466	9,204	39,404
May 25	4,759	4,857	222,214	14,312	95,769	5,463	32,973	8,908	43,368
June 29	4,957	4,854	223,883	14,500	92,333	5,325	37,762	8,828	46,447
July 27	4,926	4,896	223,756	14,535	88,626	5,817	44,316	8,217	49,517
August 31	4,833	4,911	227,132	15,014	87,217	5,630	53,134	8,539	53,173
September 28	4,778	4,829	223,043	14,675	85,324	5,632	59,827	8,172	57,657
October 26	4,730	4,758	221,184	14,863	86,423	5,710	65,499	7,728	60,872
November 2	4,759	4,769	221,870	14,594	85,930	5,371	65,943	7,434	61,636
November 9	4,779	4,714	221,302	15,001	86,963	5,401	[1]67,286	7,503	61,340
November 16	4,792	4,716	221,670	14,682	88,007	5,555	67,221	7,644	60,552
Nov. 23, 1946	**4,810**	**4,621**	.....	**15,014**	**87,446**	**5,609**	**66,543**	**7,838**	**60,065**
Nov. 24, 1945	4,469	4,563	[5]220,503	15,214	83,823	4,705	45,843	8,965	46,199
Change:									
In Week	+18	—95	+368	+332	—561	+54	—678	+194	—487
In Year	+341	+58	+1,167	—200	+3,623	+904	+20,700	—1,127	+13,866
In Year	+7.6%	+1.3%	+0.5%	—1.3%	+4.3%	+19.2%	+45.2%	—12.6%	+30.0%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922, due to shut down of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, November 17, 1945.

Crude Price Hikes Reflected In Cost of Refinery Products

The recent crude price increase, which has extended into all producing areas except California and Pennsylvania, is being reflected by hikes in prices of refinery products, with emphasis on the heavy fuel oils.

Payment of subsidies by the government on stripper well production, with exception of Pennsylvania's, has been stopped on all crude now being sold 35 cents per barrel over June 30, OPA ceilings. As that was the maximum payment under the program on other than Pennsylvania grade, the recent 10 cent raise and the earlier 25 cent advance have resulted in their being terminated. However, there exists the problem of continuation of subsidy on crude purchased by companies that have not yet met the price increase, and this must await a ruling of OWMR as to whether the raises can be considered industry-wide. If this agency determines that the hike is general, payments will cease in these cases also, even though the individual postings are not up to the general level.

Prices for No. 5 fuel are generally higher at New York harbor and New England points as several suppliers reported advancing their prices 16 cents to $2.305 at Boston and 21 cents to $2.275 at Providence, while Socony-Vacuum Oil Company posted new barge lot price of $2.37 at New York, an increase of 5 cents from $2.32. One New York supplier continued to quote $2.20 for 0-10 pour No. 5, but expects to raise the price very soon. A large Gulf Coast bunker "C" supplier is offering cargo lots at $1.38, FOB, for prompt lifting, which is comparable to last quotation at time of crude hike and which is 10 cents under another supplier's quotation earlier in the week. However, several suppliers on the Gulf Coast are asking as high as $1.59 per barrel of this bunker material in cargo lots.

☆ Mississippi

New Field Apparently Opened; Deep Prospect Being Tested

New field indicated for Adams County; testing continues on Forrest County deep test.

Adams County: Phillips Petroleum Company's Mrs. Vic Artman 1, 36-8n-2w, Pine Ridge prospect, seems certain of making a commercial producer after favorable tests of the Wilcox zone. After coring a good grade of oil sand from that horizon a drill-stem test was run at 5580-5625 feet and 3900 feet of oil recovered. Subsequently, additional section of saturated sand was cored at 5625-32 feet to make up what appears to be a fairly thick productive section. Gravity of the oil was 38. Production string has been set in preparation for further tests. Should this new well be brought in it will be the fourth field for the county and the second for this year. Previously the LaGrange field was established by the successful completion of Roeser & Pendleton-Sohio Petroleum Company's Baker Maier 1.

In the Carthage Point field The Pure Oil Company is running core tests of Geo. W. Armstrong 1, SWc 13-6n-3w. Driller is working below 10,196 feet with no shows reported. On the eastern flank of Cranfield field, Gulf Refining Company's Ella G. Lees 9, NEc 7-7n-1w, has recovered a thick section of gas sand in the lower Tuscaloosa zone at approximately 10,190 feet. Should commercial production be developed from this zone it would indicate a large increase in the known reserves of the area. In the LaGrange field Roeser & Pendleton-Sohio's F. M. Baker B-1 was coring in shale section below 6225 feet. Fair shows of oil have been recovered from cores of the Wilcox at 4626-29 feet. A drill-stem test of the same interval recovered black oil and mud.

Forrest County: The Superior Oil Company's Cassie Bradford 1, N&W SEc SW NW 1-3n-13w, Mississippi's deepest prospect, continues to test amidst a host of rumors, with the company giving out nothing. According to the latest unconfirmed report, a test produced approximately 850 barrels of oil flowing from perforations below 13,540 feet. This would be the Travis Peak section. Gravity of the oil was reported at 38. It is also reported that 2 other sections of sand were tested below 14,000 feet but carried a considerable amount of salt water. There is also a suggestion that encouraging shows have been developed in the Massive sand section which should lie at 8000 or 9000 feet at this point, but that also is questionable.

Morgan-Norton's U.S.A. 1, SE SW 15-1s-13w, is drilling below 7152 feet with no shows reported. H. H. Duck & Willis Hughes' C. O. Herchenhahn 1, NW SW 13-5n-12w, is drilling below 6050 feet after topping chalk at 5652 feet.

LeFlore County: L. Jones & S. J. Tucker's R. V. Howard 1, NWc NE NE 17-19n-2w, Tuscaloosa test, is shut down after cores of the Eutaw zone recovered nothing encouraging. Well was reported to have shows of oil in the zone between 3927-37 but they failed to develop commercial possibilities.

Holmes County: Mid-Continent Development Company's Sam D. Hall 1, SE SE SE 23-13n-3e, Tuscaloosa prospect, is drilling below 4470 feet with no shows reported. Eutaw zone was marked at 4398 feet. Skelly Oil Company's W. M. Spann 1, SW SE 22-14n-1w, wildcat, is drilling below 4567 feet in chalk. Nothing encouraging has been reported.

Lincoln County: Humble Oil & Refining Company's Lincoln County Board of Supervisors 1, NEc 16-8n-5e, deep wildcat, is drilling below 10,040 feet after running electrical log. No shows have been reported. In the Mallalieu field The California Company's Lincoln County Board of Supervisors 1, NW SW 16-6n-8e, has been successfully completed with an initial flow of 179 barrels of 38-gravity oil per day. Casing was perforated at 10,400-07 feet and Lower Tuscaloosa section acidized to establish production.

Florida

Five operations are active in the state. In Collier County, Humble Oil & Refining Company has set surface casing in Lee Cypress Company 2, SEc 28-47s-29e, at a depth of 480 feet after junking its Cypress 1 a couple of weeks ago. In the Sunniland field Humble is working below 2100 feet on Gulf Coast Realty 9, 24-48s-29e. Gulf's State 1, Lse. 373, SWc 2-67s-29e, Monroe County, is drilling below 13,310 feet after running electrical log. Shows of oil have been noted in lime streaks at 12,752-844 feet. Gulf's State 1, Lse. 374, 15-67s-27e, is drilling below 3300 feet. In Osceola County Humble's Hayman 1, SEc 12-31s-33e is running core test below 7920 feet. A drill-stem test at 7466-7502 feet recovered only salt water. In Gadsden County Havana Syndicate's A. M. Butler 1, SE SW 30-3n-1w, has set surface casing to 514 feet.

☆ California

Pacific Western's Kern Test Nears World's Depth Record

World's deep drilling record toppling as Kern County well approaches present record of 16,655 feet; Amerada Petroleum Corporation completes first well in Southern California; 2 companies block acreage for new Monterey County wildcat; Kings County deep test abandoned at 13,213 feet; Shell completion in Kerby Hills gas field extends production short distance north.

Kern County: At the present rate of drilling, and barring trouble, Pacific Western Oil Corporation's National Royalties 1, 9 miles due east of the north end of the Lost Hills field, should on December 2 be drilling below the present record depth of 16,655 feet held by Phil-

Wells Completed in United States in Week Ended November 23, 1946

Data preliminary and subject to revision. Revised and more complete data on all completions and exploration shown in monthly summaries published in last issue of each month.

State or District	FIELD COMPLETIONS: New Wells Oil	Dist.	Gas	*Input	Dry	Total	Old Wells Deepened	EXPLORATORY COMPLETIONS Oil	Dist.	Gas	Dry	Total	ALL COMPLETIONS This Week	Last Week	This Week 1945
Alabama											1	1	1		2
Arkansas	5		2		1	8							8	1	2
California	24		1		1	26					7	7	33	42	35
Colorado	2					2							2	4	
Florida											1	1	1	2	
Illinois	27				6	33					11	11	44	55	35
Indiana	1				2	3					2	2	5	12	6
Kansas	10		10		6	26	3				12	12	41	59	39
Kentucky	5				10	15		1				1	16	23	17
Louisiana	27	4	1	1	7	40			1		7	8	48	29	20
N. Louisiana	12	3	1		5	21			1		6	7	28	19	12
S. Louisiana	15	1		1	2	19					1	1	20	10	8
Michigan	1		3		3	7					8	8	15	15	10
Mississippi	5					5					2	2	7	4	6
Missouri															6
Montana	1		3			4					1	1	5	5	2
Nebraska															1
New Mexico	5		2		2	9							9	2	9
New York	15		1	10	2	28							28	26	25
Ohio	2		8		14	24					2	2	26	31	21
Oklahoma	38		5	1	23	67	1	1		1	16	18	86	98	44
Pennsylvania	27		8	15	1	51	1						52	53	54
Texas	98	1	11	1	17	128	3	4	1	1	23	29	160	130	165
E. Tex. Bor. Co.	2		3			5							5	4	4
Rest of E. Texas	2			1	2	5					1	1	6	3	8
North Texas	25		1		5	31	1	2			6	8	40	38	43
W. Central Texas	4		1			5	1				3	3	9	4	8
West Texas	35		2		4	41					4	4	45	34	50
Texas Panhandle	3		1			4							4	4	8
G. Coast, Upper	8		2		2	12			1		3	4	16	12	9
G. Coast, Lower	13	1	1		1	16		2			4	6	22	23	24
Southwest Texas	3				3	6	1			1	2	3	10	5	9
S. Central Texas	3					3							3	3	2
West Virginia	2		12		6	20							20	12	24
Wyoming	1					1		1				1	2	3	7
Total U.S.	296	5	67	28	101	497	8	7	2	2	93	104	609	606	530

* Includes salt water disposal wells.

lips Petroleum Company's Schoepps 3 in Brazos County, Texas. Drilling speed has decreased noticeably in the last few days due to the operator's desire to avoid trouble at this stage. Even so, Loffland Brothers Company drilling crews have been making an average of approximately 20 feet a day.

The well's objective is the Vedder sand, but aside from giving current depth and the objective, the operator is releasing no information. The Vedder is assumed to be very deep in this part of the San Joaquin Valley. Two years ago Standard Oil Company of California drilled a well in the Coles Levee field to the southeast, to 16,246 feet for a new world's depth record, but never revealed whether it had penetrated the Vedder sand.

Richfield Oil Corporation is presently drilling a deep test in the Coles Levee field below 13,200 feet. Production below the Stevens sand at approximately 9800 feet has yet to be obtained in this field. In the Ten Section field 4 miles northeast, Shell Oil Company is also attempting to develop production below the Stevens in its deep test, KCL-A 53-30, which is drilling below 10,490 feet.

Only other Kern County deep test now drilling is Belridge Oil Company's 62-W-33 in the South Belridge field, which is again making hole just below 14,000 feet after sidetracking fish.

In the San Emidio area, Continental Oil Company has gone into the old Ohio Oil Company's - Texas Company KCL C-11-49 and will deepen from 10,014 feet. Location is in 11-11n-22e. The well was started in 1935 by Ohio and drilled to 7595 feet. Texas took it over the following year and carried it to 10,014 feet.

Orange County: Amerada, whose California operations have heretofore been confined to the northern part of the state, is completing its first well in the Los Angeles Basin. In the Anaheim Sugar area of the West Newport Beach field, the company's Anaheim Sugar 64-7 flowed on a production test at the rate of 340 barrels of clean oil from the Upper Lyddon sand. Location has been staked for Anaheim Sugar 63-7.

General Petroleum Corporation's La Mirada Community 46-1 in 16-3s-11w is undergoing production tests at 11,780 feet. Tester plugged on the first run and hole is being reamed for retest.

Monterey County: Shell Oil Company and Honolulu Oil Corporation have blocked considerable acreage near King City and have staked a well about 4 miles northwest of the city in 4-20s-7e. Location is about 1½ miles southwest of Chanslor-Canfield Midway Oil Company's Salanco 1, abandoned in February at 2627 feet, and 1 mile west of a well drilled 20 years ago to 3725 feet. Latter well had gas showings in brown shale.

Kings County: All zones tested wet in Kings County Oil Company's Elmer C. von Glahn 1 near Alpaugh in 4-23s-22e and the well was abandoned at 13,213 feet.

Standard of California's Kettleman Hills Middle Dome wildcat, 73-30V in 30-23s-19e, is drilling below 12,100 feet in siltstone.

Solano County: Shell has extended gas production a short distance north in the Kerby Hills gas field by the completion of Wagenet 1 which flowed 1,770,000 cubic feet through a ¼-inch choke. Total depth is 2934 feet. Operator has made another step-out location to the east in 19-4n-1e and will drill Wagenet 2.

☆ Kansas

Wildcat North of Adams Ranch Field Is Possible Pool Opener

Meade County wildcat is possible pool opener; attempt to extend State pool in Cowley County is failure; Brown County wildcat recovers trace of oil on test.

Meade County: Stanolind Oil & Gas Company's Adams 2, wildcat in NE NE SW 9-35s-30w, a mile north of the Adams Ranch field, apparently will open a new oil pool if crew can exhaust increased water. The test swabbed 25 barrels of oil, with 161 barrels of water from perforations at 3774-83 feet in the Lansing lime following acid treatment. A previous drill-stem test recovered gas-cut mud, oil-cut mud, and 60 feet of oil at shallower depths. Latest test was made 400 feet off bottom, and was run for 7 hours.

Cowley County: An attempt to extend the State pool northwest has ended in failure. Earl Wakefield's Oglebee 1-C, SW NW NW 7-32s-4e, was abandoned at 2015 feet in the Lansing lime, after getting no commercial shows of oil. The State pool produces from the Lansing formation.

Brown County: Stanolind Oil & Gas Company's Wikle 1, NW SW 10-2s-15e, 3 miles north of Fairview, northeastern sector of the state, recovered a trace of oil on a drill-stem test at 3012-36 feet. Crew is drilling in the Hunton lime.

☆ Oklahoma

Southwest Maysville Bromide Production Extended North

Bromide production in Southwest Maysville pool extended north; new pool opened in Seminole County: Carter will deepen Garvin County dry hole; new pay zone opened in recently-discovered oil pool of Hughes County; prospective pool extensioner in Cotton County gets good stainings.

Southwest Maysville Area: A mile north extension for Bromide production in the Southwest Maysville pool of Garvin County has been completed by Standard Oil Company of Kansas, with the Eskridge 1, NE SW SW 18-4n-2w. The well, first venture for the company in the area, flowed 501 barrels of 44-gravity oil in 24 hours through 20/64-inch choke. Two thousand pounds pressure was registered on casing while flowing, and 1400 pounds on tubing. The Bromide was tested from 7362-72 feet, with casing set to bottom at 7376 feet.

Seminole County: A new oil pool has been opened in an old area east of Wewoka. The test, R. Olsen's Jennings 1, NW SW SW 10-8n-8e, is producing from the Cromwell sand, from 3225-50 feet, at the rate of 10 barrels of oil per hour. Additional tests in the immediate vicinity are getting under way.

Garvin County: The Carter Oil Company has taken over a Garvin County wildcat abandoned in July, and will deepen to the Hunton lime. It is the Hart 1, SE SE SE 23-3n-3w, and is west of the productive Southwest Antioch pool. Taken to a total depth of 7179 feet by Mid-Continent Petroleum Corporation before being abandoned as a dry hole, Carter and Viersen & Cochran Company will deepen the test to 75 feet in the Hunton formation, or a maximum of 7850 feet. Carter has taken over a full interest in the north half of the southeast quarter of Sect. 23, and has purchased additional acreage in 26-3n-3w.

Hughes County: B. C. Deardorff, Oklahoma City independent operator, has opened a shallow pay zone in the area east of Holdenville—a pool he opened several months ago in the Booch sand. The Miller 1-A, SE SE SE 5-7n-9e, had the Calvin sand at 880-914 feet, and following a shot with 14 quarts of nitroglycerine, the well swabbed 12 barrels of clean oil per hour. Operators are now moving in pump. Miller 1-A is a twin to the discovery, which had pay in the deeper Booch sand. Operators have agreed to drill the Booch sand wells in the center of 10-acre locations, with the Calvin wells in the northeast of southwest 2½-acre units of the 10-acre drill sites. This pattern will thus facilitate installation of a central pumping power unit.

Cotton County: Another extension to the productive Soldier Creek field is in prospect with Joe Blalock's Varner 1, NW NW NW 10-3s-11w. The well logged good saturation and stainings in the Pennsylvania sand from 1609-33 feet, and crew has set casing on top. If the well is successfully completed, it will extend the field ½ mile east. This field is among the most active in the county, and has received other extensions in various directions in the past few weeks.

362,400-Barrel Allowable Set By Oklahoma Commission

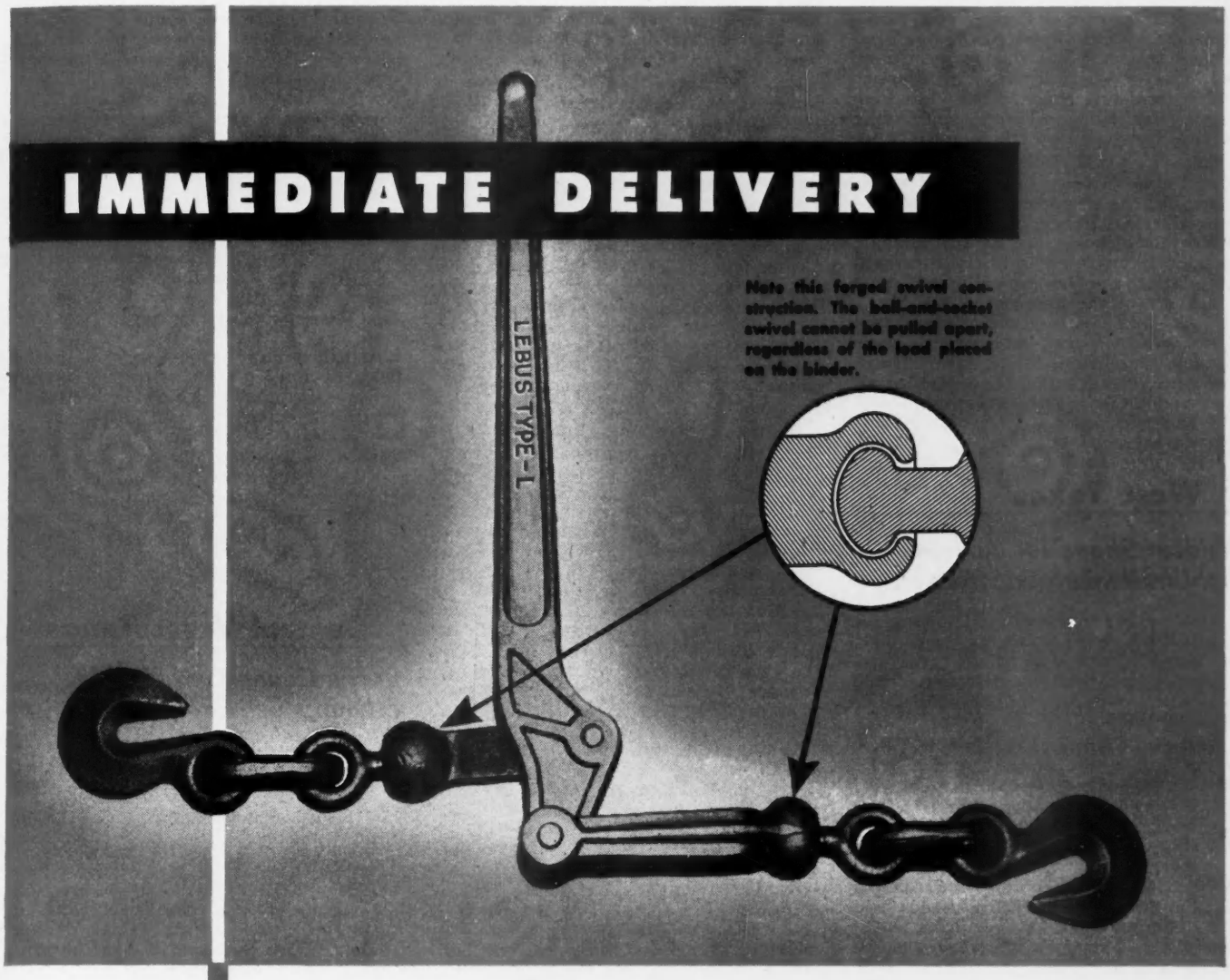
Oklahoma Corporation Commission set the daily crude allowable for December and January at 362,400 barrels and added two new fields to the list of prorated areas. Daily allowables for the next two months compare with pipe line runs of 361,318 barrels per day during October and present production of 366,000 barrels daily.

New fields added to the prorated areas include the Katie field and the Southwest Mayesville field—each of which was given a 150-barrel per well daily allowable. The Cheyarha, Wewoka Lake and West Sentinel fields were dropped from the prorated list and the Commission announced that per-well allowables for the new Cotton County fields will be fixed when new potentials are taken with testing to start early in December.

Petroleum Electric Power Group to Hold Conference

The 18th annual conference of the Petroleum Electric Power Association will be held in Tulsa, December 3-4.

Papers include: "What Utilities Should Do to Secure Production Business," by Max H. Halderson, Phillips Petroleum Company, Bartlesville; "Future Use of Electric Power for Pipe Line Pumping," by A. N. Horne, vice president and assistant manager, Texas-Empire Pipe Line Company, Bartlesville; "Refiner's Viewpoint of Electric Power Usage," by W. H. Stueve, Oklahoma Gas and Electric Company, Oklahoma City; "Electrification on Producing Oil Fields," by J. N. Poore, General Electric Company, Dallas; "Newer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Talks by C. N. Robinson, vice president, Public Service Company of Oklahoma; E. A. Armstrong, manager industrial sales, Public Service Company of Northern Illinois, and M. C. Callahan, president, Petroleum Industry Electrical Association, also are programmed.

Officers of the association are H. C. LeVois, Gulf States Utilities Company, Port Arthur, Texas, president; Duane Landon, St. Joseph Light and Power Company, St. Joseph, Mo., vice president, and Paul Griffith, Arkansas Power and Light Company, Little Rock, secretary-treasurer.

☆ West Texas

Wildcat Shows for Andrews' Eighth Ellenburger Strike

Andrews County wildcat showing for eighth Ellenburger discovery for county; oil sector of Shafter Lake area expanded; prospective discoveries in Schleicher and Crockett counties are disappointing.

Andrews County: Humble Oil & Refining Company's Sims 2, C NE NE PSL 25, Block A-39, 3⅛ miles northwest of the Nelson field and ¾ mile from the state border, temporarily passed up probable high-gravity oil production from Ellenburger, and was drilling dolomite at 10,525 feet. This wildcat entered the Ellenburger barren lime at 10,400 feet and dolomite at 10,458 feet, with elevation of 3376 feet. A drill-stem test of the dolomite at 10,465-492 feet returned 1450 feet of oil- and gas-cut mud and 30 feet of 41-gravity oil, and a small producer is virtually assured when the zone is acidized. However, the gas yield and reservoir pressure are subnormal, and comparable to the Nelson field.

Fred Turner, Jr., et al's Fisher-Shell 1, C NW NW PSL 16, Block A-36, a mile north of production in the Shafter Lake area, swabbed 10 barrels of oil hourly from open hole at 4330-4456 feet in San Andres, topped at 4330 feet. Effective pay was also encountered in Basal Grayburg. A nitro shot will follow. Rig has been skidded ¼ mile south.

Union Oil Company's Means 1-F, 2⅓ miles south by west of production, cemented pipe at 4177 feet to complete as a small pumper after 200-quart nitro shot in San Andres at 4615-90 feet, having plugged back from water at 4702 feet.

Shell Oil Company's Scarborough 1-E, Ellenburger failure for the Union field, tested sulphur water from Wolfcamp open hole at 8010-8080 feet, having plugged back from granite at 9714 feet, and is due to abandon since it is a twin to a Clear Fork Well. Barren Ellenburger lime was entered at 9380 feet, and dolomite prevailed to 9630 feet followed by 73 feet of granite wash.

Placid Oil Company and Gulf Oil Corporation's Thornberry 2, 2½ miles east by north of their Hunt field Ellenburger discovery pumper and considerably lower structurally, resumed coring after recovering 360 feet of nominally oil- and gas-cut mud from Devonian at 10,142-284 feet. The discovery, deepest producer in the district, pumps 27 barrels of oil and 800 barrels of water daily.

Coke County: Sun Oil Company's Jameson 1, C SE SW H&TC 253, Block 1-A, 18½ miles west of production, was making production test of open hole at 6225-30 feet in Crinoidal, topped at 6200 feet, and gas-oil contact at 6225 feet. A drill-stem test indicated commercial production.

Hale County: Stanolind Oil & Gas Company's Fisher 1, C SW SW E.L. & RR. 5, Block CL, Ellenburger prospect, landed 9⅝-inch protection string at 4538 feet after experiencing gas blowouts in Yates at 1585 and 1900 feet. Top of San Andres was called at 2620 feet with elevation of 3316 feet, correlating low for the area.

Failures: Stanolind's University 1-GG, Crockett County wildcat that showed oil and water from open hole at 8298-8384 feet in Ellenburger, topped at 7975 feet, has been temporarily abandoned. However, a gas-distillate flow indicated on drill-stem test at 7977-8027 feet was not tested after setting pipe at 8298 feet. The company is drilling a second test on its 3845-acre block that cost $1,102,500 cash. In Schleicher County, L. W. Elliott's Tisdale 1, 4½ miles northwest of the Page field, was idle after failing to produce from Basal Permian perforations at 2654-92 feet and from Cisco at 2709-71 feet.

Winkler County: The development of the Ellenburger sector of the Keystone field is approaching its final stages. The majority of future completions will have a comparatively thin pay zone due to their nearness to the edge of the producing area. The ultimate crude yield per acre will average considerably less as edge wells are completed with little pay above the water table.

Sid Richardson & Bass' Bashara 3-E-A, C SE NE PSL 22, Block 77, northeast edge of production and one of the lowest producers, entered the Ellenburger at 9985 feet, and completed at 10,018 feet as a precaution against water. This well flowed 607 barrels of 42.5-gravity oil through ¼-inch choke after acidizing open hole below 9989 feet. Unless the water encroachment from the east is checked by repressuring with water through key wells now being discussed by operators, this structurally-low well and others on the same producing contour and below may not pay out before the zone is flooded with water. The Keystone field has 123 wells in the Ellenburger, and 4 in the Devonian, which is productive over a large sector, but comparatively low in crude yield.

Presidio County: Argo Oil Corporation's Mitchell-State 1, near the Brewster County line and among the most isolated wildcats in the district, was idle at 9017 feet in sand and shale due to 7⅝-inch protection string having collapsed. It is in the Pennsylvanian section. The Wolfcamp, Basal Permian, was entered at 4880 feet.

Reeves County: Argo's Roberts 1, 21 miles northwest of production, flowed 42 barrels of oil, including 2 percent acid residue, on 5-hour test through ¼-inch choke after using 2000 gallons of mud acid at 9895-10,875 feet. This wildcat is bottomed at 14,073 feet in Canyon, or Upper Pennsylvanian. Future development, if any, will be nominal due to the depth and comparatively small crude yield per acre.

Mitchell County: Tobe Foster et al's Womack 1, 9/16 mile south of the Coleman Ranch field discovery, pumped 221 barrels of 25-gravity oil initial after nitro shot in Clear Fork at 2678-2775 feet. Norman and Roche's Coleman 1, discovery for the area, pumped 67 barrels initial after acid, but has since been shot with 510 quarts of nitro at 2615-2765 feet on the strength of nitro shot results recorded by the confirmation well.

Ector County: Gulf's Goldsmith 421-E, Ellenburger test near the apex of the Goldsmith structure, was drilling lime at 5225 feet, having tested a little oil- and gas-cut mud with water at 4788 feet and 4805 feet, and sulphur water at 5000 feet. Gulf and E. E. Fogelson's University 1-A, Ellenburger project for the Jordan field, resumed coring after testing oil- and gas-cut mud and 6078 feet of water at 6568-6618 feet.

American Republics Corporation's TXL 1, ⅝ mile southeast of the Murchison-Devonian area, was drilling Basal Simpson at 10,620 feet, with top of the McKee, called at 10,210 feet. Phillips Petroleum Company's Millard Unit 1, southwest outpost and structurally low, was drilling at 9620 feet.

☆ Central West Texas

Brown County Semi-Wildcat Promises Bend Production

Brown County semi-wildcat near shallow field shows promise of oil production from Bend; offsets to flowing discoveries in Jones and Fisher counties showing for small wells.

Brown County: G. C. English et al's Madison 1, Block 10, Juan Delgado Survey 789, and west of shallow production, entered the Bend at 2065 feet, with oil saturation at 2188 feet. It was drilling shale at 2690 feet, and is scheduled to continue to the Ellenburger before setting pipe. This prospect is 1¾ miles northeast of a recent Ellenburger discovery by Kleiner and Heltzel's Fomby 1.

Jones County: Mudge Oil Company's Strickland 1, SW SW S.P. Railway 41, Block 2, and east offset to the Minter pool's flowing discovery, is showing for a 15-barrel well at 3447 feet in Swastika, topped at 3440 feet or 7 feet low. Cities Service Oil Company is drilling a south offset to the discovery.

Fisher County: Skelly Oil Company's Huddleston 2-A, southeast offset to its prolific discovery for the Eskota field, tested 10 barrels of oil natural in 6 hours from Palo Pinto lime perforations at 4395-97 feet. Perforations will be made at a lower level before acidizing. The company's Huddleston 3-A, northeast offset, is pumping 5 barrels of oil and 80 barrels of water from this zone. Skelly Oil Company's Hall 1, mile south outpost, was drilling at 3060 feet.

Union Oil Activity Brisk

Union Oil Company's oil field development program in California has reached a ten-year peak. The company is operating 20 strings of tools in the state, the highest number since 1937. Bulk of its operations are in Ventura and Santa Barbara counties. Nine contract crews are engaged at the present time, an unusually large number for this company.

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☆ North Texas

Wilbarger County Has Flowing Discovery from Strawn Zone

Wilbarger County has flowing discovery; offset to Throckmorton County discovery is disappointing; shallow prospect in Montague County abandoned.

Wilbarger County: National Associated Petroleum Company and The Texas Company's Crouch 1, NW NW NE H&TC 24, Block 16, 6 miles southwest of the Odell 7-well field, flowed 129 barrels of 41.7-gravity oil, with gas-oil ratio 172/1, through 12/64-inch choke after acidizing perforations at 5023-40 feet. This wildcat was drilled to 5612 feet, and the producing zone is tentatively classed as Strawn.

Paradise Oil Company, operating unit of the W. T. Waggoner interests, was exploring the Ellenburger in drilling at 4730 feet on Waggoner 1-I, NE SE SE H&TC 11, Block 14, before running pipe to complete from Canyon pay. This wildcat tested 1900 feet of oil when tester was used at 3156-74 feet, having entered the Canyon at 3093 feet. It is ¾ mile south by west of an Ellenburger failure at 4730 feet, and ⅝ mile east by south of a 3757-foot failure.

Throckmorton County: Konrad Sztygold et al's Richardson 2, southeast offset to a 4650-foot Bend discovery awaiting official gauge, missed the discovery pay and showed water in drilling the Mississippian to 5216 feet. Pipe has been cemented at 4775 feet to try for production in the lower part of the Bend, topped at 4538 feet. Fred M. Manning, Inc., and Panhandle Refining Company assumed drilling obligations in acquiring leases near the discovery block.

Montague County: Nu-Enamel Oil Operating Company's Perry 1, L. S. Farrar Survey and 3 miles west of St. Jo, was abandoned after failing to respond to nitro shot in 3 zones of sand between 1657 feet and 1695 feet. This wildcat was drilled to 7104 feet, then plugged back.

Continental Oil Company's Copeland 1, N. Kimbro Survey and 1¼ miles west by north of the Hildreth field, failed to improve its production outlook in drilling to 6236 feet after showing oil, gas and water at 5969-76 feet in Bend conglomerate. Pipe probably will be set to try for completion.

Pipe Line Directory

A new directory of pipe line company personnel in the United States and Canada has been released by the Midwest Oil Register of Tulsa. This is the first book of its kind published since before the war.

Frank Phillips Keeps Busy As 66th Birthday Arrives

Frank Phillips, chairman of the board of Phillips Petroleum Company, Bartlesville, Okla., celebrated his 73rd birthday Thanksgiving Day at his home in Bartlesville.

Phillips, who was expected to retire when he reached 66, continues most active.

Since his 66th birthday, November 28, 1939, he has developed neohexane, a blend that further enhanced the power of aviation gasoline; begun and completed the Phillips pipe line from St. Louis to Chicago; constructed two large manufacturing plants to make new aviation motor fuel; established the Frank Phillips Foundation, Inc., to aid students of employes of the company; observed the silver anniversary of his company in 1942.

From a capital of $3000 in 1917, the company has prospered and expanded to an investment of approximately $496 million.

West Edmond Repressuring Application to Be Presented

Application for the unitization and repressuring of the Hunton lime zone of the four-county West Edmond field of Oklahoma will be presented to the Oklahoma Corporation Commission this month.

The first of a series of meetings of operators with landowners and royalty owners in the area was held recently at the Deer Creek school, in the field, and other such conferences are planned in Oklahoma City and at Edmond during the next two weeks.

The proposed plan calls for the unitization of 29,400 proved acres in Canadian, Kingfisher, Logan and Oklahoma counties. This area contains 735 producing wells. The Bartlesville sand zones will not be included in the gas repressuring program.

☆ East Texas

Leon County Wildcat Has Small Flow of Oil From Woodbine

Leon County wildcat makes small flow of oil from Woodbine; Houston County prospect nearing Paluxy zone; Pettit barren in Cherokee County wildcat.

Leon County: Daniel Oil Company's Cox 1, John Scritchfield Survey, was flowing 6 to 9 barrels of oil and rotary fluid hourly while cleaning itself through tubing from Woodbine perforations at 7036-7428 feet. Production is from thin zones of porosity logged at intervals in drilling to 7444 feet without encountering water. Cox 1 is 1½ miles west by south of Claud Bell et al's Brown-Carson 1, which is capable of pumping 5 barrels of oil daily from the same zone.

United North and South Development Company's Oden 1, W. Martin Survey, was attempting to close a casing leak that developed when production test was being made of perforating at 6887-7336 feet. It was drilled to water in Edwards at 7780-8111 feet. Oden 1 is considerably higher structurally than any test in the general area, and is credited with 16 feet of hard and tight sand in the upper Woodbine, topped at 6900 feet, with elevation of 549 feet.

Houston County: John Ivy and L. T. Moran's Murray 3, John Durst Survey, logged top of the Goodland at 9265 feet, and was coring for the Paluxy at 9305 feet. Nominal gas-distillate show was passed up in the first Woodbine sand at 7883-8197 feet. The partnership's first Woodbine test on this block was responsible for the large-scale exploratory work carried on in the south portion of the district due to having encountered an unusually thick sand bed. However, the results from this activity have been disappointing.

Cherokee County: Standard Oil Company of Texas' New Birmingham 1,

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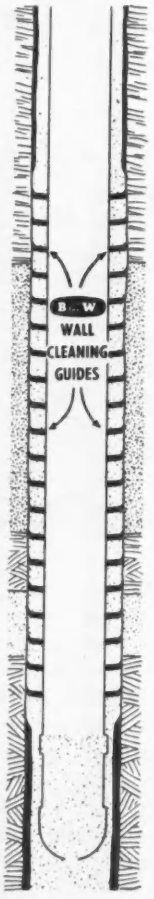

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G. E. Looney Survey, was drilling shale and lime at 9310 feet, with the next prospective producing zone due in Pettit. High-pressure gas was passed up in the Bacon and James zones in the Rodessa.

Delta Drilling Company is moving in materials for the Frances Lester-Pure 1, John Russell Survey, a Travis Peak prospect. Location is near the center of the 40 acres of the 80-acre lease contributed along with $50,000 dry-hole money by The Pure Oil Company. Sun Oil Company and others are supporting the test.

Wood County: Sun Oil Company's Clanton 1, Allen Davey Survey and 1500 feet southwest of the Woodbine pumping discovery for the Norman-Paul field, was preparing to complete from the Sub-Clarksville oil sand after proving dry in drilling Woodbine at 5284-5562 feet. Pipe was cemented at 5032 feet, and perforations have been made at 4854-58 feet to test the Lower Sub-Clarksville sand. The maximum pay in this zone was logged at 4796-4813 feet. The discovery missed the Sub-Clarksville pay due to cutting the fault at 5095 feet, but entered the Woodbine on the upthrow side at 5237 feet. Clanton 1 entered the Sub-Clarksville on the upthrow side of the fault, and found the producing zone of the Woodbine faulted out.

Humble Oil & Refining Company's McKnight 1, northeast edge of the Hawkins field, was drilling at 9890 feet in Basal Rodessa. Shell Oil Company's Goldsmith 12, projected Smackover test for the Quitman field, was drilling at 7275 feet. A small amount of low-gravity black oil appeared on pits while drilling in Glen Rose at 6930 feet, but this showing may be from the Sub-Clarksville, or Paluxy zone.

Freestone County: The Texas Company's White 1, west outpost for the Fairfield area, was drilling lime and shale at 12,265 feet.

☆ East Texas Border

Whelan Northwest Extension To Be Finaled in Rodessa

Whelan outpost completing from Rodessa; considerable development indicated for Waskom-Jonesville area.

Harrison County: Placid Oil Company and Gulf Oil Corporation will not dual complete Dunn 2, S. B. Simpson Survey, northwest extension to wet gas Whelan production. The well tested about 3000 feet of gas per hour from the Travis Peak, open hole, which was not considered sufficiently commercial. The well will be finaled in the Rodessa, where previous drill-stem tests of 96 perforations at 6890-6902 feet got a good gas blow with distillate and mud, but no salt water. Total depth is 7997 feet.

C. M. Beckett, T. P. Smith, Jr., and Atlas Oil & Refining Company's Minerva Cooper Estate 1 was completed as a southwest extension of the flush oil production's initial producer, Cargill 1, Jonesville area, Waskom west flank. No gauge, was reported, but the well was estimated good for around 22 barrels per hour on ½-inch choke. It was pinched in, flowing into 500-barrel tanks. The well was bottomed at 5937 feet in the Travis Peak and ran production string to 5922 feet. Same operators were rigging up for an offset on location 573½ feet south from east line of the Cooper fee.

Developments in the Waskom-Jonesville area's flush oil operations are causing several major companies and independents to watch that area's tests with distinct interest. An effort is being made to find Travis Peak pay across the border near Greenwood, Caddo Parish, Louisiana, by Stanolind Oil & Gas Company in Fred Wapples 1. Midstates Oil Corporation plans a deep test on the Harrison side of the Waskom area, having filed unit declaration covering acreage on both the Texas and Louisiana sides. Midstates' test may be located about 1 mile southeast of Waskom and near the state line.

☆ South Central Texas

Guadalupe County's Luling Field Area to Get New Test

New test to be drilled in Luling field area; well completed at Wiegang; Rossville area wildcat fails on production try and is abandoned.

Guadalupe County: Wiegand Well Servicing Company is moving in for another test about 500 feet west of its Anderson 1, wildcat now testing ½-mile southwest of the old Luling field. Anderson 1 is in Harriett Cottle Survey 14 on a 101-acre lease and is testing the Austin Chalk, topped at 1847 feet with a light oil show. Casing was set to 1850 feet and the well was drilled to 2050 feet.

Atascosa County: H. R. Smith et al's Wiegang 2, at Wiegang (Fashing) field, has been completed and is waiting on potential gauge. Total depth is 3793 feet with casing perforated at 3788-91 feet for completion. Rig has been moved for the No. 3 well, midway between the 1 and 2 wells.

H. S. Stahl's Pratt 1, wildcat 1½ miles southwest of Rossville, has been abandoned at 2407 feet after failing on production test at 2373-2405 feet. A previous drill-stem test at 2370-2407 feet recovered 80 feet of oil- and gas-cut mud in 15 minutes. Five and one-half inch casing was then set on bottom and the production test made. This dry hole is in F. De la Garza Survey 46, A-277.

☆ Southwest Texas

La Reforma South Extension Test Shows for Production

La Reforma south extension test showing for production; casing set in Holland field outpost; liner set in deep Duval County wildcat.

Starr County: Baldridge & King's A. Guerra 1-B is showing as a mile south extension at La Reforma field. On drill-stem test at 6048-56 feet, 350 feet of clean oil was recovered in 15 minutes through ¼-inch choke. Following this test the well was coring below 6086 feet. The well is about a mile south of previous production, which is from the 6150-foot level. The sand tested in the outpost well apparently lies higher than the regular oil pay.

Casing has been set for completion at W. H. Holland's M. M. Garcia 1, outpost about 4300 feet south-southeast of Holland's Roos et al 1, discovery oil well at Holland (Cortez) field. Total depth is 3011 feet with 5½-inch casing set on bottom and perforations not yet made. Sands with oil shows were logged

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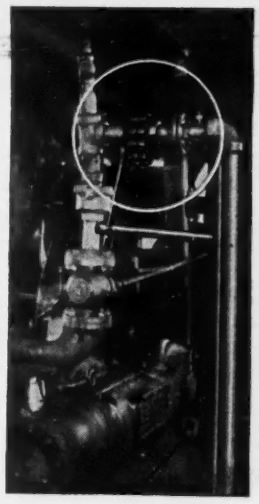

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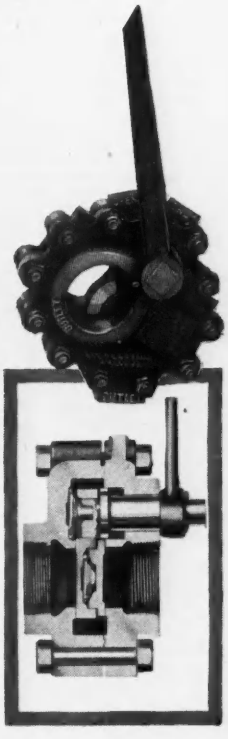

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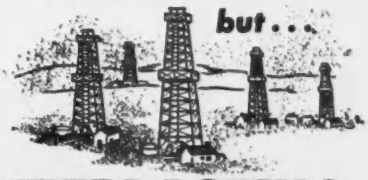

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at 2885-95 feet and at 2945-59 feet. This well is in the northwest corner of Share 105, Porcion 93.

Duval County: Liner has been set in Taylor Refining Company's E. A. Parr 1-G, deep wildcat about 1½ miles northeast of Agua Prieta field, and production tests are to be made. This well has been drilled tight to present total depth of around 11,250 feet. Liner has been set on bottom, 7-inch casing previously having been set to 7775 feet. The well attempted to blow out while drilling at 9200 feet from a sand topped at 9192 feet, but was controlled. This wildcat is 330 feet from the north line and 1100 feet from the west line of SA&MG Survey 6, about 6 miles west-northwest of San Diego townsite.

☆ Lower Texas Coast

San Patricio Discovery Finaled For 28-Barrel Potential Flow

Potential flow given San Patricio County discovery; new producer completed in 5680-pay zone at Midway; wildcat northeast of Richard King field shows for production; Live Oak wildcat tests salt water, cores ahead.

San Patricio County: Hewit & Dougherty's Lois Thornton 1, wildcat discovery in the extreme south part of San Patricio County near the Nueces-Jim Wells-San Patricio County juncture, has been completed for a potential flow of 28 barrels of oil daily through 5/32-inch choke with 160 pounds tubing pressure and 420 pounds casing pressure. This well topped gas sand at 5362 feet and cored oil and gas sand with shale streaks from that depth down to 5440 feet and logged oil sand at 5440-56 feet. Total depth is 5869 feet with 5½-inch casing set to 5501 feet. This well is 1¼ miles southeast of Gallagher field and 10 miles northeast of Richard King field.

F. M. Boykin, Jr., et al's C. V. Jones 1 has extended production in the new 5680-foot oil pay zone at Midway field about 2130 feet south-southwest of Boykin's Hutto 3, discovery of this pay. The Jones 1 has been completed for 144 barrels of 41-gravity oil daily through ⅛-inch choke from perforations at 5679-81 feet in a sand topped at 5670 feet. Tubing pressure was 920 pounds, casing pressure 1100 pounds, and gas-oil ratio 800/1. Total depth is 6068 feet.

Nueces County: Rand Morgan's Fee 1-A, wildcat northeast of Richard King field has indicated oil production at the 5600-foot level. A drill-stem test at 5605-10 feet recovered 1000 feet of oil with 140 pounds working pressure, in 10 minutes, bottom hole pressure flowing being 2300 pounds and shutin pressure 2340 pounds. The oil sand was cored at 5604-13 feet. A drill-stem test of a lower sand at 5650-53 feet developed 275 pounds working pressure and recovered 5 gallons of oil and 5 of oil-cut mud in 5 minutes. Casing has not yet been set as operator may drill deeper.

Live Oak County: Smith-Story-Wood Corporation's McWhorter 1, wildcat 6 miles south-southeast of George West, swabbed oil and salt water from perforations at 4112-16 feet and is now coring ahead. Operators set 5½-inch casing on bottom at 4122 feet after 4 drill-stem tests in the Pettus at 4112-18 feet failed to get a test.

☆ Upper Texas Coast

Old Orange Field Has New Gas-Condensate Production

New production discovered in old Orange field; Pan American active in Olive field area; Livingston field has dual completion; new producer at El Campo.

Orange County: W. V. Bowles and Company's Granger Heirs et al 1 has discovered new production in the old Orange field. Located on the south edge of southeasterly production in the Orange field-Cow Bayou area, the well was drilled to total depth of 5317 feet before 5½-inch pipe was set to total depth of 4780 feet. Pipe was perforated at 4725-35 feet where the well flowed an ungauged amount of gas and condensate. Flowing pressure on tubing was 1600 pounds through ⅛-inch choke and casing pressure was 1700 pounds.

Hardin County: Pan American Production Company continues active in the Olive field area. Its Sternenberg Lumber Company 1-B, deep wildcat 7300 feet north of production in Olive field, is testing more than 100 feet of Wilcox. Perforations at 12,838-56 feet are being tested along with open hole at 12,858-946 feet. The company has just completed the Olive Sternenberg 4, northeast extension well for the field. On a 6-hour test the well flowed 230 barrels of oil daily through 11/64-inch choke with 2150 pounds tubing pressure. Two new extension tests have been located.

Polk County: Jordan Drilling Company's I. B. Munson 2 has been completed as a dual producer at Livingston field. Both completions are in the Wilcox, the tubing completion being from perforations at 7042-52 feet that gauged 370 barrels of 36-gravity oil daily through ¼-inch choke with gas-oil ratio 635/1. The completion through the casing was from perforations at 6978-7008 feet and gauged 248 barrels of oil daily through ¼-inch choke, with gas-oil ratio 520/1. Total depth is 7060 feet with 5½-inch casing set on bottom.

Wharton County: Seaboard Oil Company of Delaware has completed a well in El Campo field. Reba S. Snell 3, E. L. Wilson survey, that flowed on potential 139 barrels of oil daily through ⅛-inch choke with 1650 pounds flowing pressure on tubing and 2550 pounds casing pressure. Gas-oil ratio was 1500/1. Production is from perforations at 6660-65 feet in a sand topped at 6650 feet.

☆ South Louisiana

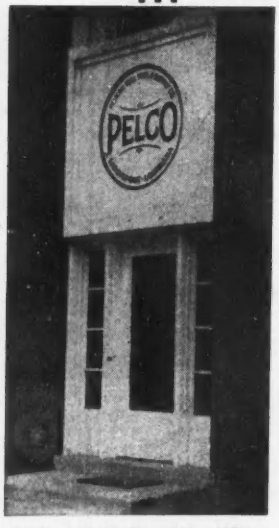
Reddell Field Extension Test Is Showing for Production

Mile northeast test at Reddell shows for production; well completed beneath salt overhang at Pine Prairie; deep Golden Meadow test given potential; new producer at Bayou Mallet completed; confirmation test located in area of Barnsdall's Long Leaf potential discovery well.

Evangeline Parish: Continental Oil Company's Pardee 7 is showing as a mile northeast extension to production in Reddell field. Total depth is 10,040 feet where electrical log was run and side wall samples taken, indicating a good sand section with gas and condensate show at 9935-60 feet. Casing has been set on bottom for production tests.

FITTINGS, of all things!

Imagine us indulging in merchandising copy! Will the ABP please take note. But what the hell! With the election over, a lot of strange things are happening. People are bustling about, cleaning house, considering new projects. Except for the calendar, this could be spring. Investment capital, like the groundhog, is coming out for a look at the weather. So here we go: FORGED STEEL, screwed end, 3,000 lb. pressure fittings. New stuff, factory fresh. No malleable or cast iron yet. Not too much of this drop-forged, but enough, maybe, if you'll hurry. List on request. Please consult John L. Lewis as to when more will be available.



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This well is in 17-4s-1w. Production in Reddell field is from the Sparta at 9600 and 9950-foot levels.

Pan American Production Company's Schlicher-Thomas 1 has been completed as an excellent oil well beneath the salt overhang at Pine Prairie field. The well drilled into salt at 6790 feet and went out at 7381 feet, total depth being 8235 feet. Casing was set to 8061 feet and perforated for completion at 6958-78 feet. Initial gauge of production was 502 barrels of 40.5-gravity oil daily through 14/64-inch choke with 1025 pounds flowing pressure on tubing and gas-oil ratio of 763/1.

Lafourche Parish: Barnsdall Oil Company's Tamplain & Talbot 1, deep test north of east side production at Golden Meadow field, flowed on potential 4,064,000 cubic feet of gas with 46 barrels of condensate daily through 14/64-inch choke. Flowing pressure was 3700 pounds and gas-oil ratio 88,400/1. Total depth is 11,501 feet with 5½-inch casing set to 10,100 feet and perforated for completion at 10,010-018 feet.

Acadia Parish: A new producer for Bayou Mallet field is Union Sulphur Company's George R. Bradley 1-A in 51-7s-1e. On potential the well flowed 113 barrels of 37.5-gravity oil daily through 7/64-inch choke with 1400 pounds flowing pressure on tubing and gas-oil ratio of 805/1. Total depth is 8703 feet with 5½-inch casing set to 8619 feet and perforated for completion at 8537-40 feet.

Beauregard Parish: Barnsdall's potential field discovery north of Gordon field is still having difficulty completing but the company feels assured enough of a producer to locate a confirmation for the area. The new test is the Long Bell Lumber Company 2, approximately ¼ mile northwest of the No. 1 well, potential discovery that continues to cut and pull tubing in an effort to recover the squeezing tool. Squeeze tool and tubing were accidentally cemented in the hole while squeeze jobs were being made at 8263-67 feet and 8224-28 feet. Total depth is 8430 feet with 7-inch casing set on bottom.

Arkansas Well Has Shows

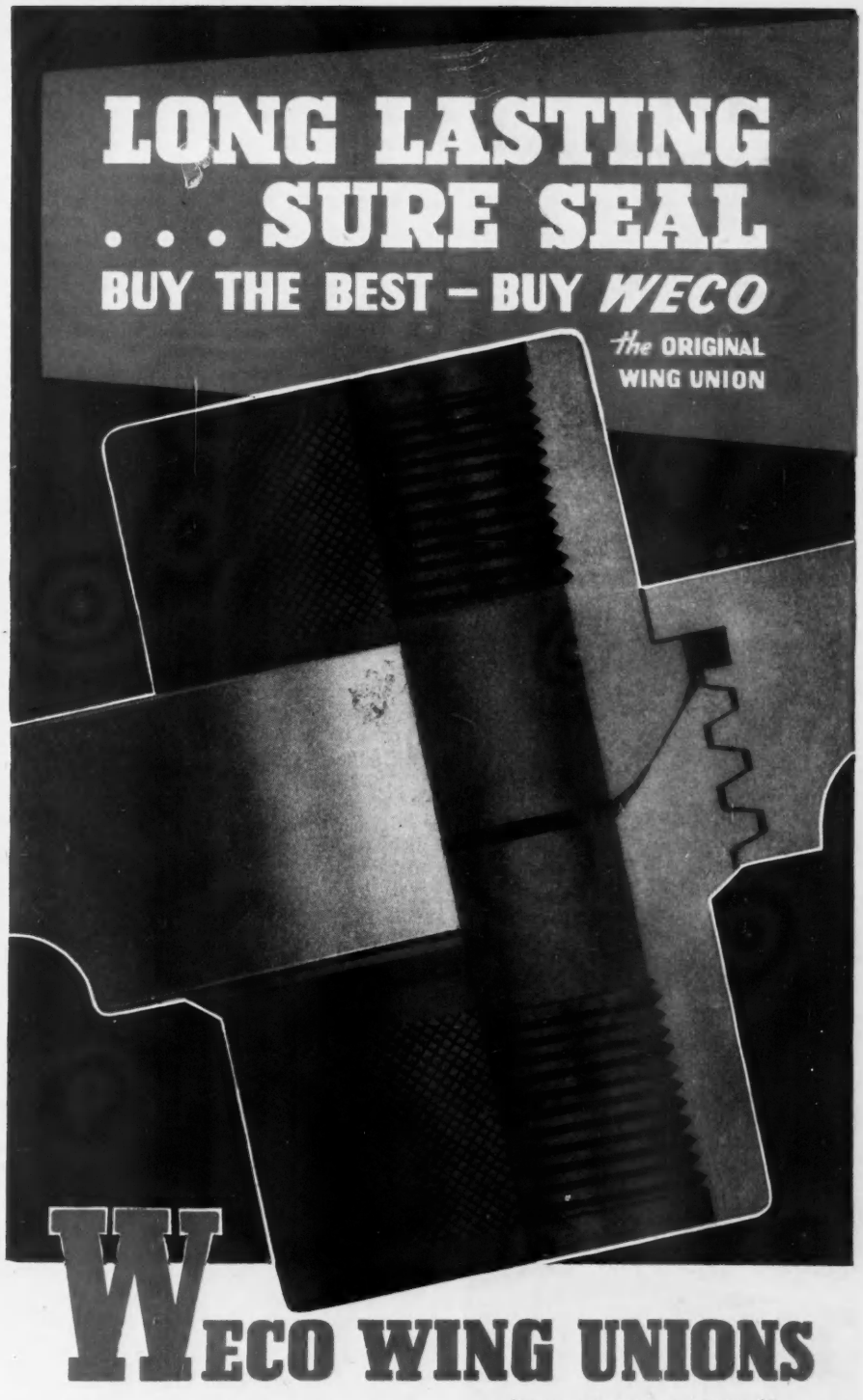
Albert Plummer's Crosset 1, C NE NE 25-17s-6w, Ashley County, 7 miles east and south of Hamburg, is reported to have logged good oil shows in the Cotton Valley at 4000-4100 feet, and to be drilling below 4200 feet. Some interest in leasing and purchasing of minerals has been motivated by this report.

☆ North Louisiana

Franklin Parish Has Producing Area East of Winnsboro

Franklin Parish gets another producing area east of Winnsboro; DeSoto Parish wildcat reports good show of oil; deep test in Jackson Parish completing for good gas producer.

Franklin Parish: Atlas Oil & Refining Company's Ayer Timber 1, wildcat, SW NW 26-14n-9e, was completed and gauged 4,150,000 cubic feet of gas from perforations at 6572-86 feet in the Tuscaloosa. Shut-in pressure was 2444 pounds. The gas was accompanied by a flow of 15 barrels of condensate per million feet. This opens a new producing field 11 miles east of Winnsboro. Rig is being moved in for an offset,



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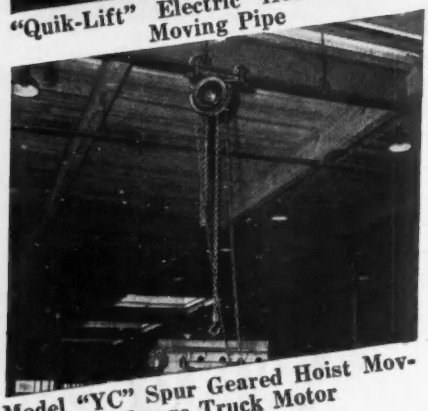

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Ayer Timber Company 2, C NW NW SE 26-14n-9e.

Big Chief Drilling Company's Mackie Bradley 1, C SE SE NW 35-14n-8e, has logged first indications of sand in the Tuscaloosa at 5660 and a second sand at 5687. The test is 6 miles east and 1 mile south of Winnsboro.

DeSoto Parish: F. A. Callery's B. C. Strauss 1, 19-14n-14w, 1 mile west of Gloster, is drilling below 5592 feet after running electric log. A good show of oil was reported at 4069-89 feet.

Richland Parish: R. T. Sellars and R. D. Kellogg logged gas and oil stains in the Rodessa at 2990-3000 feet and are drilling below 3125 feet at John Hemler Estate 1, C NW NW SW 12-16n-6e, wildcat 3 miles east of Lucknow. Showings were not commercial.

Jackson Parish: Shell Oil Company's deep test, Tremont Lumber Company 3, 21-15-1, bottomed at 12,355 feet, made 1,955,000 cubic feet of gas through 5/8-inch positive choke, with perforations at 9820-44 feet.

Catahoula Parish: Lyons & Prentiss and Penrod Drilling Company's wildcat, J. P. Mitchell 1, C NW NW 36-8n-7e, was reported perforating at 3920-26 feet, and shut down for rig repairs after squeezing perforations at 9339-46 feet, with total depth 9471 feet, to where 5½-inch casing string was set.

Caddo Parish: Stanolind Oil & Gas Company's Fred Wappler 1 test in 20-17-16w, Greenwood sector, near the Harrison County, Texas, line, was moving in machinery. The well will be drilled to the Peak, which it is hoped will yield flush production as it has in the Waskom-Jonesville area of Harrison County.

Phillips Makes Geological, Land Departments Changes

Frank Phillips, chairman, and K. S. Adams, president, Phillips Petroleum Company, have announced the following changes in the land and geological department:

O. H. Whitcomb, as assistant superintendent of the land department in Bartlesville, Okla., has assumed supervision of the Kansas district in addition to the Rocky Mountain district and Canada. J. F. Hardwick, Bartlesville, has been made division geologist for Oklahoma City, Shawnee, and Bartlesville districts.

M. H. Steig has been transferred from Houston to Midland, Texas, to become district geologist for the West Texas and Southeast New Mexico district. H. H. Allen has been transferred from Bartlesville to Houston where he will become district geologist for the Gulf Coast district.

R. F. Rood has been transferred from Wichita, Kansas, to Houston, to become district landman for the Gulf Coast district. F. J. Latinis has been transferred from Houston to Wichita, Kansas, to become district landman for the Kansas district.

R. E. McPhail has been transferred from Corpus Christi, Texas, to Bartlesville to become division geologist for the Gulf Coast and South Texas districts. O. M. Hudson has been transferred from Evansville, Indiana, to Corpus Christi, Texas, to become district geologist for the South Texas district. I. J. Pierce, Evansville, Indiana, is to become district geologist for the Illinois district.

☆ Michigan

Drilling Permits for Week Set Five-Year High for State

Thirty-one drilling permits approved for the week set a 5-year high in Michigan, including 10 wildcats and 12 shallow gas locations. Previous high for the year was 30 permits, which equaled high points for 1944 and 1945. An all-time high was established in 1941 with 57.

Bay County: Rated as one of the most important exploratory tests of the year, H. E. Bell's Kehr 1, NW NE SE 31-16n-3e, logged Dundee objective at 3189 feet and at a drilling depth of 3319 feet no pays had been logged.

Osceola County: Taggart Brothers Gas Company's Dair 5, C NE 14-17n-7w, gauged 1½ million cubic feet of gas in Michigan Stray sand at 1510 feet to extend the Stray gas zone in the Garfield pool 1½ miles northwest.

☆ Illinois Basin

Gibson County, Indiana, Pool Is Given New Pay Horizon

North Princeton pool, Gibson County, Indiana, has new pay horizon; Mt. Carmel pool, Knox County, extended; Lincoln County, Kentucky, deep test quits.

Indiana

George and Wrathers' Beloit 1, NE NE NW 8-2s-10w, Gibson County, is opening a new horizon for the North Princeton pool, now producing from McClosky lime. After a 1 hour drill-stem test which showed 60 feet of oil and 140 feet of oil-cut mud, the well set pipe to Cypress sand at 1820-35 feet.

Knox County: Ray Dee, Trustee's Steckler 2, SW NW NW 23-1s-12w, is extending the Mt. Carmel pool ½ mile north with Bethel sand production. The well swabbed 3 barrels of oil per hour from Bethel sand and is now cleaning out after a 20-quart shot.

Posey County: Central Pipe Line Company's Wiley 1, C N½ NW SE 18-5s-13w, is certain to give the East New Harmony pool a new pay zone. During a drill-stem test at 1980-2010 feet, the well made 690 feet of oil and 600 feet of oil-cut mud from the Palestine. Operators are drilling ahead. The pool now produces from McClosky lime.

Kentucky

The California Company's deep test in Lincoln County has been abandoned as dry in granite at 6117 feet. Previously, the well was temporarily abandoned after no shows were found and the drill was erroneously reported in the granite.

☆ Ohio

Perry County's Clayton Pool West Edge Well Yields Gas

Clayton pool edge well makes gas; North Sego extended; large gasser at Richville; North La Grange lens thins to the south; Monroe County test shuts down.

Perry County: Zanesville Tool and Supply Company moved 800 feet north

for S. I. Forsyth 3, SE SW 1, Reading Township, along the west edge of the Clayton pool, and found 1¾ million cubic feet of gas in the top of the Clinton, which usually is dry. The sand was topped at 3115 feet and drilled 25 feet in. At North Sego, Pennick et al's S. N. Forsyth 1, NE NE 21, Madison Township, extended the pool ¼ mile east. Clinton, 3299-3359 feet, made 48 barrels in 24 hours after shot.

Stark County: A ½ mile west extension of the Richville field was made by a large gas well completed by the East Ohio Gas Company on the Stark County Commissioners, SW SE 32, Perry Township. Clinton at 4262-4290 feet had over 3 million cubic feet natural, which after shot gauged 6 million with 1400 pounds pressure.

Lorain County: Ohio Fuel Gas Company's F. S. Boone 1, Lot 47, La Grange Township, found only a thin Clinton lens at 2430-2434 feet with 575,000 cubic feet of gas. The well is a south extension to the North La Grange pool.

Monroe County: Barnesville Development Company's A. C. Peters 1, 27, Malaga Township, is still shut down at 5170 feet after finding the Oriskany sand with no shows of either oil or gas.

☆ Rocky Mountain Area

Fremont County, Wyoming, Test Disappoints in Mesa Verde

Sinclair Wyoming's test in Lysite area, Fremont County, Wyoming, is disappointment in Mesa Verde; Continental has new pay horizon in Madison; test near San Draw field has gas shows in 3 Frontier sands; Shell spuds Niobrara County wildcat.

Wyoming

Sinclair Wyoming Oil Company's important test of the Lysite area, Fremont County, west of Casper, has proved a disappointment in a good sand in the Mesa Verde section between 10,440-475 feet. Unit 1, NE NE NW 35-39n-91w, is another of the deep basin wells now being drilled in the Rocky Mountain area, and has revealed interesting data concerning the section. The well topped Mesa Verde at 6264 feet and on 2 previous drill-stem tests made a total of 15 million cubic feet of gas but on test this week with total depth of 10,475 feet flowed water in 41 minutes. The well probably will be completed at its present depth as a small gas well.

Continental Oil Company has found a new pay horizon in the Madison at Circle Ridge, north of Lander in the Wind River Basin. The well, Shoshone 4, SE SW NW 6-6n-2w, swabbed through perforations between 1600-1665 feet at the rate of five barrels of oil per hour, and is estimated good for 200 barrels per day on pump. The oil is 23.9-gravity. The Circle Ridge field has produced from the Tensleep formation at depths around 900 feet for the past 20 years but has been shut in a large part of the time due to lack of market for the crude.

Sand Draw Oil Company's test 3 miles south of the Sand Draw field at Unit 1, NE SW NE 26-32n-95w, attracted attention after topping Frontier formation at 3755 feet and having shows of gas in the 3 Frontier sands encountered. The well is at 4492 feet, total depth, and while several drill-stem tests have been taken, the operator has not released the information on these tests. Hole is now being reamed to set casing and test the sections through perforations. This well is scheduled as a Tensleep test. At Sand Draw proper wells have produced gas for a number of years from the Frontier formation and this gas is distributed throughout central Wyoming by Northern Utilities Company. The Tensleep formation in the field now has 3 wells producing approximately 1500 barrels per day.

Carbon County: Kerr-McGee and Phillips Petroleum Companies have had several shows of gas at their Baggs wildcat in lensing sands of the Wasatch (Tertiary) formation and on drill-stem test at 2982-3000 feet the well had a good blow of gas but water followed immediately. The well is Unit 1, C SE SE 10-12n-92w, and is planned as a Frontier sand test at depths estimated around 7500 feet.

Niobrara County: After an extensive exploratory campaign covering a 3-year period Shell Oil Company is starting the first well of a series of wildcat projects scheduled for drilling in the Rocky Mountain area. Government 1 near Manville was spudded last week. Surface casing has been set at 525 feet. The well is about 35 miles west of the Nebraska-Wyoming line.

Shell has had two of its own geophysical crews and two contract crews at work in Wyoming for many months and presently has about 75 employes in the area in addition to the development personnel now engaged in drilling the first well. Offices are maintained at Casper and Kemmerer and a third office will be opened soon at Denver. Rocky Mountain exploration is in charge of M. Guy Edwards, manager of the company's exploration department on the West Coast.

Colorado

Continental Oil Company's Elk Springs test at Smith 1, NW SE SW 30-5n-98w, Moffat County, has now cleaned out to bottom following a 77 quart shot in the Weber section between 6087-6140 feet. In cleaning out the well the operator estimated little increase in production resulting from the shot and it is not expected that the well will do much over 100 barrels per day. This Weber sand discovery caused considerable excitement in the northwestern Colorado area when oil was found on drill-stem test in the Weber section. However, water logged at around 6150 feet thinned the producing section considerably below that at nearby Rangely field. No production tests have been made since the sand was shot.

Rio Blanco County: What may be the first dry hole in the Rangely field is now being completed by Continental at Rooth 4, C NW NW 22-2n-103w. Weber was topped at 6915 feet (sample) and had a datum of minus 1142 feet. The water level on this side of the field as established by Continental's Rooth 1, 2 locations north, is only minus 1160 feet, and this allows only a small pay section for the new well. Analysis of cores from 6916-35 feet showed some saturation, with the sands possibly water-bearing, and the well is now being drilled to 6945 feet before testing is completed. This well is south of a fault between it and Continental's Rooth 2, completed this year as a Shinarump sand discovery well.

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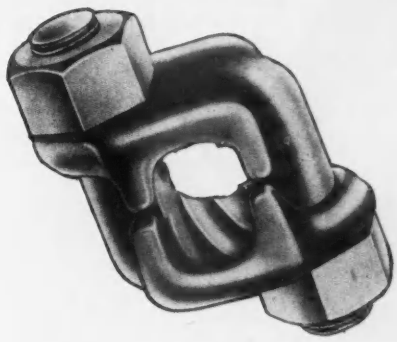
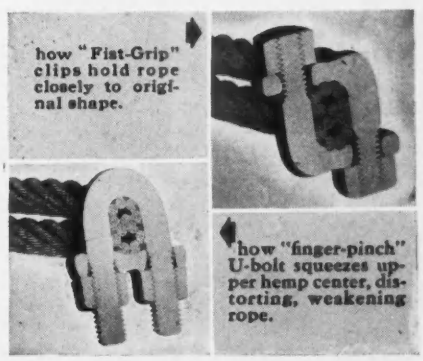


Cross-section views (nuts tightened to same tension by torque-indicating wrench) show—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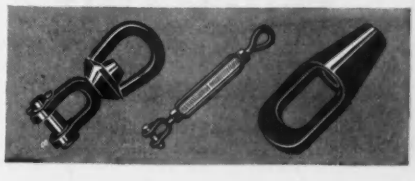

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EXPLORATORY COMPLETIONS

ALABAMA WILDCAT

Geneva County—Failure: Shell's C. L. Ashley 1, nwc 32-1n-21e, Strat. test, abnd 11-16-46 at 3320.

CALIFORNIA WILDCATS

Kern County—Failures: Continental's BVA 1, 8-32s-25e, Buena Vista Lake area, abnd 11-20-46 at 10,021.

Frank and Elmer von Glahn's 4, 8-29s-28e, Kern River area, abnd 11-17-46 at 4000.

General Pet. Corp.'s Hall-Baker 66-4, 4-30s-21e, McKittrick area, abnd 11-17-46 at 7099.

Tide Water's Fee 65-18, 18-25s-20e, Kettleman Hills S. Dome area, abnd 11-46 at 4000.

Yolo County—Failure: Texas Co.'s Stephani 1, 28-9n-1w, Dixon area, abnd 11-17-46 at 5486.

Kings County—Failure: Kings County Oil Co.'s von Glahn 1, 4-23s-22e, Tulare Lake area, abnd 11-20-46 at 13,213.

Monterey County—Failure: Texas Co.'s Aurignac 2, 4-23s-10e, San Ardo area, abnd 11-16-46 at 1067.

FLORIDA WILDCAT

Dixie County—Failure: Sun's Hazel Langston 1, nw se 8-8s-14e, abnd 11-10-46 at 3671.

ILLINOIS WILDCATS

Clay County—Failures: Olson Drlg. Co.'s Smith 1, sw sw ne 15-3n-6e, abnd 3072.

Nat. Assoc. Pet. Co.'s James 1, sw nw ne 5-5n-5e, abnd 2504.

Fayette County—Failures: W. R. Britton's Paradee 1, sw nw sw 12-7n-3e, abnd 1866.

W. L. Bolden et al's Kanatzar 1, se se sw 13-7n-3e, abnd 1962.

H. Luttrell et al's Dorr 1, nw ne ne 35-5n-3e, abnd 2044.

Hamilton County—Failure: Walter Duncan's Hannagan 1, sw sw sw 13-5s-7e, abnd 3558.

Jasper County—Oil Discovery: Secure Oil Co.'s Ireland 1, nw nw nw 11-6n-10e, pump 66 bbls fr Rosiclaire 2657-62, td 2673.

Jasper County—Failure: Superior of Calif.'s Worcester 1, se nw se 8-5n-9e, abnd 3152.

Marion County—Failures: Lohman - Johnson Drlg. Co.'s Hahn 1, ne ne ne 2-1n-4e, abnd 2996.

B. W. Quick's Henning 1, se ne ne 31-3n-1e, abnd 1601.

Shelby County—Failure: Nat. Assoc. Pet. Co.'s Gawthrop 1, 22-10n-6e, abnd 2260.

Wabash County—Oil Discovery: Gilliam & Aspin Drlg. Co.'s Herring 1, ne ne sw 27-1s-14w, flow 240 bbls fr O'Hara 2966-69, td 2971.

Washington County — Failure: Nation Oil Co.'s Toensig 1, nw sw nw 9-1s-4w, abnd 2421.

INDIANA WILDCATS

Miami County — Failure: Rich Valley Development Co.'s Horner 1, se nw se 3-27n-5e, abnd 1260.

Posey County—Failure: H. L. Cokes' Oeth 1, 23-7s-13w, abnd 2775.

KANSAS WILDCATS

Barber County—Failure: Skelly's Harbaugh 1, sw ne ne 15-33s-12w, abnd 4950.

Barton County—Failure: Royer & Farris' Jurgeson 1, se se nw 16-19s-13w, abnd 3523.

Brown County—Failure: Stanolind's Wikle 1, nw nw sw 10-2s-15e, abnd 3435.

Butler County—Failure: J. P. Gaty's Kirkpatrick 1, se sw ne 14 28s-3e, abnd 3030.

Ellis County—Failure: Aylward Prod. Co. et al's Skaggs 1, nw nw se 6-12s-20w, abnd 3965.

Harvey County—Failure: J. E. Palenski's Meetz 1, c s½ s½ se 33-22s-2e, abnd 2505.

Rooks County—Failures: P. M. Polhamus et al's Veverka 1, nw nw sw 21-8s-19w, abnd 3523.

Doley Oil Co.'s Henderson 1, sw sw nw 23-10s-19w, abnd 3699.

Rush County—Failure: William Cross et al's Oet Kin 1, nw nw se 11-19s-16w, abnd 3785.

Saline County—Failure: D. D. Fowler et al's Bickel 1, ne ne se 22-16s-1w, abnd 2638.

Shawnee County — Failure: Charles Key's Renyer 1, ne ne ne 18-13s-16e, abnd 2268.

Sheridan County—Failure: Stanolind's Wiman 1, se se se 3-10s-27w, abnd 4674.

KENTUCKY WILDCAT

McLean County: Miller & Shiarello et al's Wiggins 1, 20-N-27, flow 85 bbls fr Tensleep 1595-1610, td 2252.

NORTH LOUISIANA WILDCATS

Franklin Parish—Distillate Discovery: Atlas O&R Co.'s Ayer Timber Co. 1, sw nw 26-14n-9e, 11 miles e of Winnsboro, Midway 4418, Clayton 4917, Gas Rock 4935, perf 70 shots 6572-86, flow 4 mln gas open, 15 bbls dist per mln, gor 66,000/1, comp 11-18-46 at 7027.

Franklin Parish—Failures: Atlas O&R Co.'s H. B. Cox et al 1, c ne nw 9-15n-9e, Clayton 3955, Gas Rock 3966, Tuscaloosa 4347, L. Cret. 5218, abnd 11-9-46 at 5352.

American Liberty Oil Co.'s J. E. Holt 5, 14-16n-8e, 2½ miles s of Delhi prod, abnd 11-12-46 at 4316.

Madison Parish—Failures: Atlas O&R Co.'s Edna M. Yerger 1, 440 n 335 w of sec irr. sect 50-16n-14e, Clayton 5905, Gas Rock 5950, Tuscaloosa 5990, abnd 11-9-46 at 8010.

C. H. Osmond's Anderson-Tully Lbr. Co. 1, c se se 26-17n-14e, Wilcox 2700, Midway 3610, Gas Rock 5103, Tuscaloosa 5805, Marine Tuscaloosa 6200, L. Cret. 6680, abnd 11-16-46 at 7510.

Morehouse Parish — Failure: Texas Co.'s Doles 1, c sw nw 10-23n-8e, Wilcox 1554, Midway 2227, Gas Rock 2692, Cotton Valley 2852, Smackover 2909, abnd 11-16-46 at 3653.

Ouachita Parish — Failure: Crescent Drlg. Co.'s W. C. Feazel-Caldwell 1, nw 18-18n-3e, Gas Rock 2328, Tuscaloosa 2711, Anhydrite 3370, abnd 11-9-46 at 3392.

SOUTH LOUISIANA WILDCAT

St. Mary Parish—Failure: Amerada's South Shore 1, 38-14s-10e, s of Charenton prod, abnd 11-5-46 at 9007.

MICHIGAN WILDCATS

Allegan County — Failures: A. J. Boeve's Cappon 1, ne se nw 3-1n-16w, abnd 11-16-46 at 1212.

Circle Drlg. Co.'s Gile 1, sw sw sw 9-1n-14w, abnd 11-15-46 at 1292.

J. W. Lang Co.'s Maley 1, sw nw se 21-3n-15w, abnd 11-21-46, td 1404 ft.

Eaton County—Failure: Fisher-McCall's Zuber 1, se nw nw 8-2n-3w, abnd 11-17-46 at 2507.

Huron County—Failure: Pure's Schreiber 1, n½ nw nw 7-15n-10e, abnd 11-21-46 at 4450.

Gladwin County—Failure: C. E. Weller's Bessler 1, sw sw se 12-18n-2w, Dundee 3727, abnd 11-18-46 at 3881.

Isabella County—Failures: H. E. Bell's Meyers 1, nw sw ne 36-13n-4w, Dundee 3539, abnd 11-14-46 at 3557.

Merrill and Clayton's Maybee 1, ne se se 12-15n-5w, Dundee 3770, abnd 11-16-46, td 3784, pb 3778.

Mecosta County—Failure: C. W. Teater's Lucht 1, sw nw se 8-15n-9w, Dundee 3500, abnd 11-14-46 at 3637.

Van Buren County—Failure: S. L. Godfrey's Cuber 1, se se ne 9-2s-15w, abnd 11-16-46 at 1290.

MISSISSIPPI WILDCATS

Grenada County—Failure: J. R. Lockart's Lamon 1, sw sw 22-22n-6e, chalk 1403 ft, Eutaw 2228 ft, abnd 11-9-46 at 2765.

Issaquena County—Failure: C. H. Murphy, Jr., & Sun's J. Atkinson 1, nec se sw 4-9n-8w, Wilcox 2094 ft, Gas Rock 3737 ft, Tuscaloosa 3747 ft, abnd 11-17-46 at 4005.

MONTANA WILDCAT

Petroleum County—Failure: Burks Teigan's Teigan Bros. 1, ne ne ne 31-15n-25e, McDonald Creek area, Ells 1240, 1242 td, comp 11-17-46 at 1242.

OHIO WILDCATS

Ashland County—Failure: Ditch and Gerig's J. W. Moore 1, Lot 89, Sullivan Township, abnd 11-20-46 at 2614.

Meigs County—Failure: Theiss Oil Co.'s A. D. Cole 1, ne ne 16, Orange Township, abnd 11-13-46 at 1651.

OKLAHOMA WILDCATS

Comanche County—Failure: Kingery Brothers' Doyle 1, cse nw 7-4n-11w, abnd 2516.

Cotton County—Failures: F. S. Hutchinson's Eller 1, nw nw nw 36-1s-12w, abnd 2357.

D. H. Bolin's Collins 1, se sw sw 33-2s-9w, abnd 2607.

S. D. Johnson's McGee 1, sw sw ne 25-2s-14w, abnd 3015.

O. M. Stack's Graham 1, se se sw 32-3s-10w, abnd 1476.

W. R. McClelland's White 1, cnw sw 4-3s-13w, abnd 2524.

T. A. Norwood's Creswell 1, se se ne 17-4s-10w, abnd 1534.

R. L. Fisher's Dugan 1-A, nw sw sw 5-5s-12w, abnd 1560.

W. H. Spradling's Hale 1, nw sw nw 17-5s-12w, abnd 2011.

Garvin County — Failure: Helmerich & Payne's Hewbern 1, 33-4n-3e, abnd 2976.

Hughes County—Oil Discovery: Sherrof & Apperson's Barnard 1, se sw ne 23-8n-8e, pump 60 bbls fr Wapanucka-Union Valley, 3278-95 ft; td, 3296.

Jefferson County—Failure: C. P. Burton's Melton 1, se se nw 8-4s-8w, abnd 2504.

Lincoln County—Failure: Texola Drilling Co.'s Seaba 1, ne ne se 17-14n-3e, abnd 5175.

Logan County—Failure: Piggott Oil Co.'s Fry 1, nw se nw 22-19n-2w, abnd 5572.

McClain County—Failure: Carter Oil Co.'s Hastings 1, cse nw 29-7n-3w, abnd 10,901.

Okfuskee County—Gas Discovery: Ralph Fillmore's Palmer 1-A, cse nw 34-11n-10e, flow 1,630,000 ft gas fr Gilcrease, 3069-91 ft; td, 3123.

Oklahoma County—Failure: Double R. Drilling Co.'s Reinhardt 1, sw sw nw 5-14n-1e, abnd 5904.

Seminole County—Oil Discovery: George W. Hassell's Patterson 1, ne se nw 29-7n-6e, pump 10 bbls fr Calvin, 2400-17 ft; td, 2417.

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■ 1 F x F 4 x 5 Gardner Denver Slush Pump 250' 2⅜ OD Sullivan N Rod Yellow Strip. Both items are new and will not split them. George R. Miller, Box 61, Pinedale, Wyoming.

■ Complete power rig consisting of the following: Model U-10 Unit Rig Company Drawworks powered with 3, Model D-13000, Caterpillar Diesel Engines, compounded.
1—7¼" x 14" "Oil Well" power mud pump.
1—5" x 10" Gardner Denver power mud pump, powered by 1 Model D-13000, Caterpillar Diesel Engine. Cameron Blow-out preventer equipment. 1—126' Lee C. Moore Jacknife Mast with substructure. 6,250 feet good 4½" Drill Pipe. All other equipment for complete rotary rig. This rig is in good condition, running at the present time, and may be inspected on location. Big Chief Drilling Company-Mississippi. 613 Ardis Building, Shreveport, Louisiana.

■ Well drilling machines, Fort Worth, Wichita, Keystone, Star spudders, standard outfits; Sullivan drills, steel derricks, tools, cable. All equipment overhauled or rebuilt and guaranteed. S. W. Pressey, Pueblo, Colorado.

■ RIG FOR SALE—Emsco 135' Derrick, Acme equipped. Donovan Boilers, 1000' Drill Stem. Located in Florida. R. R. Starnes, P. O. Box 7, Orlando, Florida.

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17— 6" ID Crane Tees, Fla.
12— 6" ID Nordstrom Valves, Fla. MN 125 SP.
In Purification Plant used less than six months. The Oxford Pipe Line Company Ltd., Brownsville, Ontario, Canada.

■ FOR SALE: Fort Worth "J" Spudder with 54 Ft. 6 Sheave Steel Mast, Complete with All Tools from 6 Inch to 15 Inch Inclusive—125 H.P. Diesel Motor—Steel Dog House, All in Good Condition. Located in Odessa, Texas. Telephone 975 or 1298 Midland. Box 73, Midland, Texas.

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1—Model 922, short wheel base, single winch, otherwise same as above. $6500.00.
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1—Tandem Trailer, Pole, Fruehauff, 11:00 x 20 tires, Air brakes. $2000.00.
1—Tandem Trailer, Pole, Fruehauff, 11:00 x 24 tires, Air Brakes. $2000.00.
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All Tires in Good Condition.

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FOR SALE

■ Small drilling rig, boiler, Oil Well Rotary, two winch tractors, seven well lease. Morgan Quine, 2035 College, Beaumont, Texas.

■ Lumber for sale: 5 cars 3 x 12—10' to 16' Hardwood $49.00. 5 cars 3 x 6 & wider Hardwood roadway lumber $43.00 to $49.00. Fir timbers 12 x 12 & larger 40' to 120' in length. 1 x 2 and 2 x 2 Surveyor stakes. Hardwood pallets for sale. E. J. Gaiennie Lumber. Box 1074, Shreveport 89, La.

■ NEW CORE DRILL: Franks Model FA—Heavy Duty hydraulic, kelly drive, rated 1500 feet. 4½" x 6" Gardner-Denver pump. 27 foot mast. Mounted on 138" wheel base, 1946 model 4-wheel drive 3 ton Oshkosh truck; 10 speed, with 9:00 x 20 ground grip tires, dual rear. Hercules 320 cu. in. engine. Factory mounted Tulsa 18 winch in front. 140 feet new 2⅜" drill pipe, kelly, bits, hose and tools included. Designed for core, shot-hole, or water well drilling in difficult areas. Drill completed in September, tested, but never used. Location, Colorado. Price $12,000. Identical drill working same area. Same unit present cost in excess $13,500. Box 101, The Oil Weekly, Houston, Texas.

■ New Mathey Type E Reeling Equipment with hydraulic governor—spool capacity 15,000'. Complete with Type B Combination Measure Meter and Weight Indicator, priced $100 below present market price. Box 100, c/o Oil Weekly, Houston, Texas.

■ Cardwell K. L. Double Drum Rotary Draw Works. G. K. 145 Waukesha engine, perfect condition, can see operating. New 34 Tulsa Winch. 5-sheave 100-ton Dreadnaught Crown Block. P. O. Box 709, Phone 596, Conroe, Texas.

■ For Sale: One year old Frost Gravity Meter in excellent condition and a new 1946, Ford Automobile. Both for $6500. Box 102, c/o The Oil Weekly, Houston, Texas.

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PIPE GRINDING MACHINE designed and built to give pipe line contractors maximum service in polishing the bevel on plain end pipe in preparation for welding. The machine can be placed on pipe easily and quickly, and will clean the bevel on 24-inch pipe in 15 seconds, whereas a man with file would have to work at least 15 minutes. The grinder is constructed for durability, light weight, effectiveness and economy. Electrically driven, it may be operated from electric welding machines on the line.

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■ For lease—Oil and gas rights under six untested sections of land checkerboarded in N.W. Pecos County, Texas, near Williams Pool. Owner can furnish good title. Secs. 20, 24, 26, 30 and parts Secs. 2 and 10 of Bl. OW. Address: Box 105, c/o The Oil Weekly, Houston, Texas.

FOR RENT

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POWER PUMP
New 5 x FXO Gardner-Denver Powered with new Waku Motor.
6000 pound test Cameron Blowout Preventers

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Jack Knife Derrick
126 Foot Lee C. Moore.
2 10¾ 6000 pound test Shaffer Blowout Preventers.

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HELP WANTED

■ **Geologists, Micropaleontologists, Petrographers, and Petroleum Engineers wanted for service with major oil company in South America. Salary dependent on qualifications. Applications may be made in person or by letter to: Gulf Oil Corporation, New York Production Division, 17 Battery Place, New York 4, N. Y., Room 1633.**

■ Geophysical Interpreter experienced in seismic computing and interpretation needed by oil company for interpretation of Seismograph work being done currently. Permanent location. Give age, education and experience in first letter. Our own employes in this field know of this advertisement. Box 96, c/o The Oil Weekly, Houston, Texas.

■ Young graduate Geologist to work in West Central Texas in geological and geophysical lines. Drafting, general surveying and subsurface knowledge required together with eagerness to learn. Earl Robert McFarland, 2825 S. 1st, Abilene, Texas.

■ Geophysicist wanted by expanding contract geophysical company. Must have thorough experience in review interpretation of seismic data, preparation of final maps and reports. Preferably also experienced in gravity interpretation and mapping. Permanent location at Dallas, Texas. Please state education, age, experience, salary expected and date available. Address Box 103, c/o The Oil Weekly, Houston, Texas.

SITUATION WANTED

■ Petroleum Engineer with Major Company for eleven years; superintendent of operations for five years; capable of assuming full responsibility for drilling and production program. Just returned from 28 month tour of overseas duty with Army Corps of Engineers and is seeking a responsible position with a drilling and production company. Can furnish best of references. Box 99, The Oil Weekly, Houston Texas.

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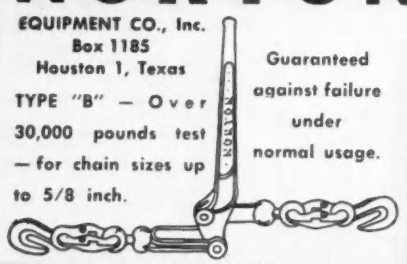

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WEST TEXAS WILDCATS

Dawson County—Failure: Ray A. Albaugh et al's Morris-Conoco 1, c se nw T&P Ry. 32, blk 34, T-4-N, elev 2859, anhydrite 1540, San Andres 3540, abnd 11-19-46 at 4005.

Pecos County—Failure: Peck-Penn & Richardson's Tyler 1, se se se H&GN Ry. 12, blk 9, elev 2412, Yates 1410, abnd 11-16-46 at 2460.

Winkler County — Failures: M. J. Delaney Co.'s Sealy-Smith-Stanolind 1, c se se G&MM B&A 16, blk A, elev 2792, anhydrite 950, Yates 2600, San Andres 4020, Glorietta 5220, abnd 11-16-46 at 5952.

Stanolind's Sealy-Smith 10, c nw nw G&MM B&A 27, blk A, elev 2813, anhydrite 970, Yates 2610, San Andres 4000, Glorietta 5200, Tubb 6080, abnd 11-13-46 at 6390.

WEST CENTRAL TEXAS WILDCATS

Fisher County—Failure: Horne Oil Co.'s Wheeler 1, 330 out nec Geo. Creath sur 221, elev 1841, anhy 1690-1865, Dothan 2545-2595, Noodle Creek 2643-2690, Saddle Creek 2855, Flippen 2908, abnd 11-18-46 at 4630.

Jones County—Failures: J. C. Hunter Jr. et al (was Fain-McGaha's) Minter 1, (OWDD) 330 wel 3241 snl of sbdn 12, Robt. Smith sur 192, otd 2319, elev 1704, Swastika 2378, abnd 11-18-46 at 2467.

Jones-Stasney & Mohawk Drlg. Co.'s Hicks 1, 330 ewl, 1320 nsl sect 5, Orphan Asylum Lands, elev 1628, Gunsight 2180, Adams Branch 2825, reef lime 2825, Palo Pinto 3286, abnd 11-17-46 at 4970.

W. H. Rogers Jr., Tr.'s Herndon 1, se se sw S.P. Ry. 16, blk 2, elev 1814 abnd 11-19-46 at 2951.

R. H. Roark-L. F. Hooker & Roark's Moore 1, 1650 nsl, 2108 ewl T&P Ry. 3, blk 16, elev 1722, Gunsight 2523, abnd 11-19-46 at 2575.

NORTH TEXAS WILDCATS

Archer County—Failures: Reno Oil Co.'s Jentsch 1, 1300 snl 150 wel blk 115, J. W. Harris sbdn, abnd 11-11-46 at 1220.

Reno Oil Co.'s Weinzapfel 1, 330 ewl 990 nsl sect 107, blk 4, Clark & Plumb sur, abnd 11-20-46 at 1968.

Clay County—Oil Discovery: Jack Grace et al's B. Edwards 1-C, 1891 n 1305 w of swc of blk 34, Maruon CSL sur, but in S. C. Beldon sur, 3¼ mi w of prod, elev 932, Bend 5905, flow 1800 bbls 41-gr, gor 5000/1, natural via 3-in outlet fr Bend conglomerate 6070-88, comp 11-21-46 at 6088.

Cooke County—Failure: R. B. Hollandsworth Drlg. Co.'s Miller 2, 1356 snl 756 wel of 175-ac tr, W. Hester sur, abnd 11-9-46 at 1391.

Haskell County—Failure: Tom D. Humphrey's Collier 1, 1400 ewl 1700 snl of J. E. Ellis sur 52, elev 1491, abnd 11-13-46 at 4532.

Montague County—Failure: Phil Lesh - McCall's Cunningham 1-D, 243 n 900 e of nwc of Mary Burnsides sur, but in Griffin Bayne sur-elev 879, abnd 11-11-46 at 2820.

Wilbarger County—Failure: Frank Wood et al's Dave Melton 1, c ne se H&TC 15, blk 5, elev 1110, abnd 11-15-46 at 2510.

Wilbarger County — Oil Discovery: Nat. Assoc. Pet. Co.-Texas Co.'s Crouch 1, nw nw ne H&TC Ry. 24, blk 16, 6 mi sw of prod, elev 1342, lime 5012, flow 129 bbls 41.7-gr, gor 172/1, via 12/64-in, 2000 gals acid in perf 5023-53, td 5612, pb 5053, comp 11-14-46.

EAST TEXAS WILDCAT

Cherokee County—Failure: W. H. Foster et al's Ellis 1, 330 out nwc 80.46-ac lse, 1210 wel 330 snl John S. Stroud sur, elev 524, Navarro shale 2695, Navarro chalk 2875, Pecan Gap 3225-3665, Austin 4130, abnd in water 11-20-46 at 4333.

SOUTHWEST TEXAS WILDCATS

Duval County—Failures: Edwin B. Cox-Jake L. Hamon's Leila Peters 2, 990 e of swc sur 66 and sec G. P. Garcia sur 15, 175 s of nl SA&MG sur 1, 1 mi se E. Peters fld, 1200.31-ac lse, abnd 11-9-46 at 2806.

W. Earl Rowe et al's Emma Norton 1, 725 fr n&s&el lot 1, blk 12, Realitos sbdn, Jose M. Hinojosa Gr, 48.32-ac lse, abnd 11-10-46 at 5210.

SOUTHWEST TEXAS NEW PAY TEST

Jim Hogg County — Patel Gas Discovery: Newman Bros. Drlg. Co. et al's Julian Vela Pena 1, (OWWO) 330 fr s&el lot 32, M. W. White sbdn, Mrs. Bartlett sur 589, El Peyote Gr, 40-ac lse, abnd 10-24-46 at 2977, pay 1576, perf 1578-83, flow gas, no gge, 3/16-in, comp 11-7-46 at 2977.

LOWER TEXAS COAST WILDCATS

Live Oak County—Failure: Rowan & Hope's E. Sinor 1, 330 fr nw&swl 51-ac lse, on Stanolind 200-ac farmout, n cor John Ely sur, abnd 11-12-46 at 4502.

San Patricio County — Failure: W. Earl Rowe et al's Herbert P. Brouillette 1, 467 fr s&wl 160-ac lse, sw¼ sect 80, abnd 10-12-46 at 6018.

LOWER TEXAS COAST OUTPOSTS

Brooks County—La Gloria Failure: Magnolia's Otis Cosby 1, 660 fr n&e&wl lot 4, blk 5, ½ mi nw Falfurrias, 2/3 mi s of s flk oil prod, 138.67-ac lse, abnd 11-15-46 at 9015.

Jim Wells County — Armagosa Failure: Haynes B. Ownby Drlg. Co.'s Lester Moore 1, 660 fr n&wl N. Gossett sur 98, 660 fr n&el 462.75-ac lse, ½ mi w shallow gas prod, abnd 11-8-46 at 6811.

LOWER TEXAS COAST NEW PAY TESTS

Brooks County—La Gloria Oil Discovery: Argo Oil Corp.'s Birdie B. Riley 3-A, 360 fr el 1320 fr sl 99.8-ac lse, lot 13, blk 8, pay 6961, perf 5 shots 6970-71, flow 304.67 bbls 43.4-gr oil 1/8-in, gor 868/1, tp 1825 lbs, cp 2075 lbs, comp 11-4-46 at 7406.

Jim Wells County—Tijerina-Canales Oil Discovery: Texas Co.'s H. C. de Tijerina 37, 2338 fr nl 3000-ac lse, 6182½ w of el sur 270, in A. Canales sur 360, pay 6990, perf 6990-95, flow 54.15 bbls 42.5-gr, 5/32-in, gor 752/1, comp 11-10-46 at 7600.

UPPER TEXAS COAST WILDCATS

Ft. Bend County—Failure: Geo. H. Echols' Mrs. Mary D. Myers 1, 330 fr wl 330 s of sly/nl 792.85-ac lse, 330 fr wl 2417.1 fr nl Wiley Martin sur, sw Old Richmond Prospect, abnd 11-14-46 at 8012.

Harris County—Failures: J. W. Frazier's Houston Deepwater Ld. Co. 1, 3075 s Buffalo Bayou, 3000 fr sl 2358-ac lse, Thos. Earl sur, abnd 11-19-46 at 8602.

Jack W. Frazier's R. E. Brooks Est. 2, 450 ne at ra fr n bnk Buffalo Bayou, 708.4-ac tr, Richard & Robert Vince sur, abnd 11-20-46.

UPPER TEXAS COAST NEW PAY

Wharton County—Withers Distillate Discovery: Texas Co.'s Pierce Est. 122-C, 4299 fr sel 467 fr swl "C" Lse 4488-ac lse, John Caldwell sur, pay 6650, perf 60 shots 6650-70, flow 12.5 bbls 53-gr, 3,715,000 gas, 1% wtr, 7/16-in, comp 11-3-46 at 8466.

WYOMING NEW PAY TEST

Fremont County—Circle Ridge Discovery: Continental's Shoshone 4, se sw nw 6-6n-2w, Tensleep 700, Madison 1285, Darby 1975, Big Horn 2045, Fault Madison 2090, Ellenburger 7150, pump 200 bbls 23.8-gr perf 1600-1665, comp 11-18-46 at 2864.

Texas Field Named

Two recent discoveries in the South Texas district have been named by the Nomenclature Committee of the South Texas Geological Society. "East Charco Redondo" is the field name given to the area recently discovered by F. P. Schwab's A. Garcia A-1, on the Charco Redondo grant in Zapata County. "Landa" field is the name given to the area recently opened by Stanolind Oil & Gas Company's H. Landa 1, located on the A. de Gato grant in Hidalgo County.

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SQUEAKS from the BULL WHEEL

Poet's Nook

Of all the things I might be
I had to be a lousy tree.
A tree that stands out in the street
With little doggies 'round my feet.
A nest of robins I must wear
Night and day they muss my hair.
I lift my leafy arms to pray,
"Go 'way, little dog, go 'way."
Of all the things that I might be
I had to be a durned ol' tree!

All's Quiet

"I hear you and your husband are not getting along well together."

"Of all the silly, vicious rumors! Oh, it's true we had an argument and I shot him—but that's as far as it ever went."

Good on Defense

"What military experience have you had?" asked the sergeant of a flashily dressed Negro who had presented himself for registration.

"Well, sah, I been shot at twice."

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SAFE SUPPORT FOR HEAVIEST BOILERS

OWEN Boiler Jacks are rigidly constructed and well braced to safely support the heaviest boilers, yet they are designed so that one man can easily move them into position and level the boilers.

Heavy channel iron cradle and base, welded-on seamless posts, heavy welded braces, 3½" O.D. lift screw . . . these assure long service under severe conditions. Correct design, careful workmanship . . . *these* simplify operation and make it easy to keep boilers in absolute level position.

Compare your present boiler supports with Owen Boiler Jacks . . . we believe you'll want a set of the jacks right away. They're available for immediate delivery through your supply store.

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Oil Field Brines, Waters and Cores
Complete Evaluation of Crude Oils

Long Distance 267 Box 132, Houston, Tex.

This Curious World

Advice to women: If you can't get married in the spring, better look around for some fall guys.

Most reformers represent the meddle class.

Gals who eat too much sweets are bound to have too much seats.

Sign in a drug store: Use our cough syrup—you'll never get any better.

Nothing makes a woman look better than three cocktails inside a man.

This would be a better country if the Indians had had stricter immigration laws.

Some girls are cold sober. Others are just plain cold, drunk or sober.

Most girls attain their ends through lack of exercise.

Up to the age of 15 a boy may be a boy scout. After that he's a girl scout.

Wall flowers with nice stems are glad to be cultivated.

An optimist is a man who marries his secretary thinking he'll be able to keep on dictating to her.

When you tighten your belt it's a recession; when you have no belt to tighten it's a depression; and when you have no pants it's a panic.

Bad Example

"Where you going?" asked the farmer of his hired man, who had just borrowed a lantern.

"Sparkin'."

"Carryin' a lantern is a waste of money. When I went sparkin', I went in the dark."

"Yeah, and look what you got."

The Lowdown

"I have a pain in my abdomen," said the rookie to the Army doctor.

"Young man, officers have abdomens. Sergeants have stomachs. YOU have a bellyache."

This'll Take Figuring

"Where can I get hold of you?"

"I dunno. I'm ticklish all over."

The Woman's Way

"I've never seen your eyes so dreamy."

"Naw, and you never stayed so late before."

Hard-Hearted

"Please let me go, lady," begged the burglar. "I never did anything wrong."

"Well," smirked the old maid, "it's never too late to learn."

Perfect Pair

"Is my girl smart! Boy, she has brains enough for two."

"Then she's just the girl you ought to marry."

The Modern Way

A small boy asked his father if he had any work he could do around the place to replenish his finances. The father assured him that he could think of nothing.

"Then," the little boy answered, "how about putting me on relief?"

"Best Bet Yet"

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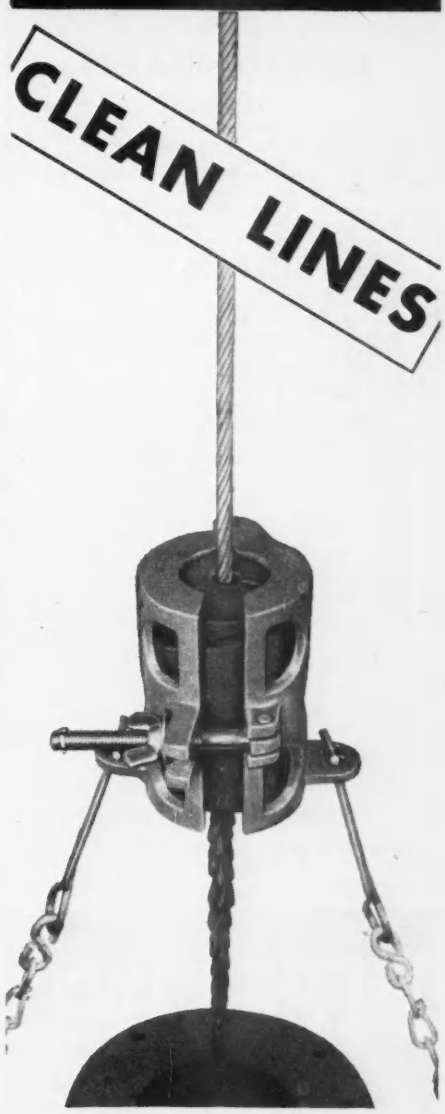

A clean wire line helps your crew. They can work safer and better on a clean floor, free from drippings. With a Patterson-Ballagh Wire Line Wiper the line is stripped completely of mud and oil. A compact steel housing contains a spiral rubber which is inexpensive and easily replaced. The rubber wipes the line as it comes out of the hole. Sparkproof. Use one on every well.

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TECTONIC MAP
of the
UNITED STATES
1944

Prepared under the Direction of the Committee on Tectonics, Division of Geology and Geography, National Research Council.

Chester R. Longwell, Chairman, Philip B. King, Vice-Chairman.

Charles H. Behre, Walter H. Bucher, Eugene Callaghan, D. F. Hewett, G. Marshall Kay, Eleanora B. Knopf, A. I. Levorsen, T. S. Lovering, George R. Mansfield, Watson H. Monroe, J. T. Pardee, Ralph D. Reed, George W. Stose, W. T. Thom, Jr., A. C. Waters, Eldred D. Wilson, A. O. Woodford.

A NEW GEOLOGIC MAP OF THE UNITED STATES AND ADJACENT PARTS OF CANADA AND MEXICO

Geologic structure, as evidenced and interpreted by a combination of outcropping areas, bedrock, surface disturbance, and subsurface deformation, is indicated by colors, symbols, contours, and descriptive explanation. Igneous, metamorphic, and selected areas of sedimentary rock are mapped. Salt domes, crypto - Volcanic disturbances, and submarine contours are shown. The base map shows state boundaries, rivers, a pattern of cities, and 1-degree lines of latitude and longitude.

The scale is 1:2,500,000, or 1 inch equals 40 miles. Printed in 7 colors on 2 sheets, each about 40 x 50 inches. Full map size is about 80 x 50 inches.

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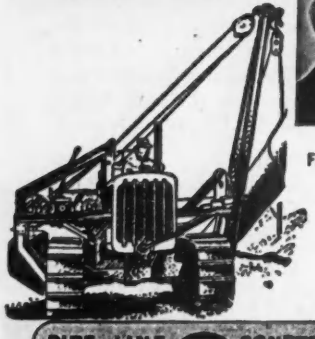

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DOZERS TRACTORS

SMITH CONTRACTING COMPANY
ODESSA, TEXAS

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W. K. Warren was reelected president of Warren Petroleum Corporation at the annual meeting of stockholders. Other officers reelected: **J. A. LaFortune,** executive vice president; **H. E. Felt, H. W. Harts, S. I. Hulse, J. H. Boyle, J. A. Padon** and **J. E. Allison,** vice presidents; **J. T. Oxley,** secretary; **A. J. Murphy,** treasurer; **D. M. Mattocks,** assistant secretary; and **A. B. Clark,** assistant treasurer.

»

W. E. Morgan has been named division land man for Union Oil Company's Northwest Division, with headquarters at Seattle. **J. E. Koogle** will be division land man for the Valley Division with headquarters at Bakersfield, Cal., and **H. K. Said** will be division land man for the Coastal Division with offices at Santa Maria, Cal.

»

H. H. Moody of Ponca City, Okla.; **E. E. Nolen, Jr., W. A. Rembert, Jr.,** and **Dan Rogers,** all of Dallas, have incorporated the Rayflex Exploration Company to operate in Texas. Headquarters are at Dallas.

»

Arthur A. Swenson and **Lawrence Nelson,** both of Manor and **Oscar Olson** of Austin have incorporated the Car-Nel Oil Company, Inc., to operate in Texas.

»

Joe Beard has joined the geological department of Schweer & Hardison, Wichita Falls, as assistant field geologist. He was graduated from the University of Texas in 1942, and served overseas in the U. S. Marine Corps.

»

Howard Coonley, chairman of the execvisor of the office of **J. L. Singleton,** ards Association, has been elected president of the new International Organization for Standardization, the formation of which was completed by delegates from 25 nations meeting in London.

»

R. H. Sherman, vice president and director of Creole Petroleum Corporation, has been named coordinator of operations. He succeeds **J. A. Clark,** who has been chosen executive assistant to the coordinator of foreign and domestic production for Standard Oil Company (N.J.).

»

Ivan C. Alspach has returned to Akron as manager of mechanical goods for Goodyear Tire & Rubber Export Company. Since 1944 he has been the company's mechanical goods representative for the Atlantic seaboard, with headquarters in New York. Succeeding Alspach in New York is **William H. Klippert,** a member of the company's mechanical goods sales staff since 1944.

»

W. E. Sievers, oil tool executive, has moved his offices to the Quinby Building, Los Angeles. Sievers recently resigned as chairman of the board of the Security Engineering Company, Inc.

Charles E. Simons, Austin, Texas, has been appointed vice president and general manager of the Texas Mid-Continent Oil and Gas Association. He will assume his duties January 1, with headquarters in Dallas, Texas. Simons takes the position made vacant by the recent death of **George C. Gibbons.**

»

Robert M. Youngs has been elected president of Louisiana Land & Exploration Company, succeeding **E. B. Tracy,** who has retired because of illness.

»

W. H. Davison, assistant to the president of Core Laboratories, Inc., has been named vice president and general manager. He will continue to have his offices at Dallas.

»

H. M. Dawson has been made managing director of Jessop Steel International Corporation, a subsidiary of Jessop Steel Company.

»

Pell W. Foster, Jr., vice president and director of Foster-Wheeler Corporation, has been appointed vice president in charge of production.

THE OIL MAN'S CALENDAR

DEC. 3- 4	Petroleum Electric Power Association, Annual Conference, Tulsa, Mayo Hotel.
4	New Mexico Oil & Gas Association, Annual Meeting, Artesia.
9-11	Interstate Oil Compact Commission, Quarterly Meet, Dallas, Adolphus Hotel.
16-18	Annual Advalorem Tax Forum, Mid-Continent Oil & Gas Association, San Antonio, Plaza Hotel.
MAR. First Week	South American Petroleum Congress (ISAP), Lima, Peru.
17-19	AIME World Conference on Mineral Resources, New York, Waldorf-Astoria Hotel.
20-22	AIME 75th Anniversary Celebration and Annual Meeting, New York, Waldorf-Astoria Hotel.
APRIL 7- 9	National Association of Corrosion Engineers, Annual Convention, Chicago, Palmer House.
16-18	Eastern District, API Division of Production, Spring Meeting, Pittsburgh, William Penn Hotel.
23-25	Natural Gasoline Association of America, Annual Convention, Dallas, Baker Hotel.
APRIL 30 MAY 1- 2	American Gas Association, Spring Meeting, Chicago, Stevens Hotel.
6- 8	Petroleum Industry Electrical Association and Petroleum Electrical Supply Association, Joint Convention, Houston, Rice Hotel.
15-16	Pacific Coast District, API Division of Production, Spring Meeting, Los Angeles, Biltmore Hotel.
22-23	Mid-Continent District, API Division of Production, Spring Meeting, Amarillo, Texas, Herring Hotel.

Nomads Chapter monthly meetings: LOS ANGELES, second Wednesday, Mayfair Hotel. Houston, second Monday, Ye Olde College Inn. NEW YORK, first Monday, Louis Sherry's. TULSA, third Wednesday, Hotel Tulsa. DALLAS, date not yet fixed.

M. H. (Pat) Marr and **J. B. Dickerson** are president and secretary, respectively, of the Marr Producing Company, a Delaware corporation that has been issued permit to operate in Texas. Headquarters are in the Gulf States Building, Dallas.

»

J. S. Fluor, Jr., and **Milton Lewis,** formerly vice president and general manager and vice president and director of sales, respectively, for Fluor Corporation, have formed the firm of Fluor, Lewis and Company, sales and engineering consultants, with headquarters in Los Angeles. The new concern will represent E. B. Badger and Sons Company in 11 Western States.

»

Jake Jarmon, R. C. Whitfield and **C. C. Ross, Jr.,** all of San Antonio, have incorporated the Biry Oil & Gas Corporation to operate in Texas.

»

George B. McCamey and **J. W. Carter,** both of Fort Worth, and **W. J. Mosely** of Wichita Falls, have incorporated the Cache Creek Drilling Company, with headquarters at Fort Worth.

»

Howard Hansen has been named supervistor of the office of **J. L. Singleton,** manager of district offices of the Allis-Chalmers Manufacturing Company, Milwaukee.

»

Henry A. Thouron has been appointed assistant to the director of sales of the synthetics department of Hercules Powder Company and will aid in coordinating the district sales offices with the central sales offices. He has been with Hercules since 1934, except for a period in the service from 1940-45.

Deaths

Carl Buerbaum, Jr., 39, Tulsa independent oil operator, was killed November 21 on a deer hunt 19 miles north of Kent, Texas. His body was found beneath a boulder at the bottom of a cliff. Buerbaum was associated with his father, **Carl Buerbaum,** of Dallas. He was formerly oil editor of the Tyler *Courier-Times,* Tyler, Texas.

»

L. L. Cohen, 55, chairman of the board of Union Asbestos and Rubber Company since 1941, died October 25 at Highland Park, Ill. He was formerly a president of the company he founded in 1918, and had earlier associations with Union Supply Company, Union Pacific and Southern Pacific Railroads.

»

John A. Chapman, 47, vice president and partner in Grey Wolf Drilling Company, Houston, died November 21. He was formerly vice president of Lucey Products Company in Tulsa and was also associated with Frick-Reid Supply Company in Tulsa before going to Houston.

»

Frank Cross, 76, secretary-treasurer and a director of Sun Oil Company, died November 25 in Philadelphia after a month's illness. He started with the company as a bookkeeper in 1898 and was elected treasurer in 1904.

»

Harry W. Huber, sales and field service representative of Spang and Company of Butler, Penn., was killed in a plant accident on November 18, his birthday. He was 48 years old and had worked for Spang five years. Born in Clarion County, Pennsylvania, Huber lived in Brookville and was engaged in drilling and gas production when he joined Spang and moved to Butler in 1941.

»

James S. Power, 74, of Overton, Texas, prominent banker and holder of large East Texas oil interests, died November 26.

»

Asa P. Davis, 77, superintendent of transportation for Sun Oil Company in the Dallas division and an employe for 47 years, died November 25.

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Cementing

"Oil Well Cementing Handbook" by Cedric Willson has recently been released by the Trinity Portland Cement Company. The text, tables and charts have been completely rewritten and revised and several new sections which did not appear in the old handbook have been added. All types of oil well cementing operations are discussed with recommendations which are intended to aid in obtaining more satisfactory cementing jobs.

Strength charts include the period from eight hours to 24 hours as well as the conventional 1, 3, and 7-day tests. Pumpability curves at high pressures as well as at atmospheric pressure are shown. A section on Gel-Cements contains helpful information on the properties of cement slurry to which bentonite has been added.

A copy of the handbook will be sent to anyone engaged in a responsible position in the oil industry by the Trinity Portland Cement Company sales office at Dallas, Fort Worth or Houston.

HOT NEWS ABOUT A COLD WEATHER PROBLEM!

OIL FIELD NEWS

PARAFFIN REMOVED FROM 16,400 FOOT LINE IN LESS THAN 30 MINUTES

Yes, through use of the patented new PARACUT method for removing Hydrocarbon deposits from flow lines, an operator in Louisiana regained maximum capacity of a 16,400 foot line in approximately 27 minutes. Paraffin deposits were removed completely. Line pressure dropped to normal. Flow returned to normal. PARACUT is equally efficient on lines of any length or diameter.

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Petroleum Statistics

The 1946 edition of "Twentieth Century Petroleum Statistics," compiled by E. DeGolyer and Lewis W. MacNaughton, Continental Building, Dallas, is being distributed.

The handbook, first published in 1945, is a compilation of many tables from original sources. Because it filled a practical need, the director of Naval Petroleum Oil Shale Reserves, Commodore W. G. Greenman, U. S. Navy, urged that it be maintained on an annual basis.

Preparation of the tables and charts contained in the handbook was originally done by Lieut. Robert J. Bradley, USNR, now a civilian and associated with DeGolyer and MacNaughton as petroleum economist.

Price is $7.50.

Standards

The American Standards Association recently announced publication of its 1945-46 Yearbook. This is the first yearbook published by the association since 1938. It contains much new material of value to engineers, executives, and technical students. The book gives information about officers and members of the board of directors, of the Standards Council, and other policy forming committees of ASA. It also carries such basic documents as the constitution and bylaws of the ASA; and much information about the organization and how standards are developed. The center section of the book is devoted to a listing of approved American Standards and projects under development together with the scopes of these projects and names of officers and members of active technical committees. Free copies may be obtained from American Standards Association, 70 East 45th Street, New York 17, N. Y.

Welding

"Manual of Design for Arc Welded Steel Structures" compiled by LaMotte Grover, member of the American Society of Civil Engineers and published by Air Reduction, is a comprehensive source of up-to-date information that will facilitate the rapid design of welded steel structures and provide a suitable supplementary text for engineering students. Methods and procedures presented are based chiefly upon standards of the American Welding Society, the 1946 edition of the Specifications of the American Institute of Steel Construction, and reports of the Welding Research Council's Structural Steel Committee.

The manual contains 26 diagrams for the rapid proportioning of welded-groups and connections subjected to eccentric loading. Other important contents include beam safe-load tables, with piecemarks of standardized weld connections for each size of beam and each span-length. Comprehensive discussions cover the estimating of costs in welded construction, and the inspection of structural welding.

A copy of this 285-page book may be obtained for $2 from Air Reduction Sales Company, 60 East 42nd Street, New York 17, N. Y.

Engineering Laboratories of Tulsa Disposes of Building

Engineering Laboratories, Inc., Tulsa, has sold its building to Miss Helen Eisenstein, New York City, for a consideration in excess of $300,000.

President W. G. (Bill) Green, Tulsa, revealed that the sale provides necessary capital for an expansive working program for the concern, with one of the major tasks being completion of a $1,700,000 purchase order placed by the Soviet government for standard products manufactured by the firm.

The Tulsa manufacturing firm will retain occupancy under a 25-year lease, obtained as one of the considerations in the sale. The Engineering Laboratories are in a block-long building at 602-24 E. Fourth Street.

It was disclosed by Green that the purchasing commission representing the Soviet government is engaged in negotiations with the company on two other contracts amounting to approximately $500,000.

The firm has been in business nine years, during which time gross production of technical and oil field equipment grew from a small amount to $3,111,000 in 1944.

"Sale of the building," Green stated, "was necessary because the company had too much of its capital invested in fixed assets and never did have enough adequate working capital because of postwar reconversion difficulties, and being unable to obtain critical components. The company has additional financing arrangements in process which include issuance of 60,000 shares of new stocks, of which 40,000 have already been contracted for."

Stewart & Stevenson Engineers Attend Factory Training School

Stewart & Stevenson Services has sent 15 diesel service engineers from the company's main plant at 4516 Harrisburg Blvd., Houston, and from branch offices in Dallas, Corpus Christi and McAllen, Texas, to the Cleveland Manufacturing plant of General Motors diesel engines, where they will attend a factory training school, it was announced by Joe Manning, general manager.

H. K. Porter to Move Two Pump Manufacturing Operations

H. K. Porter Company, Inc., is moving its two Quimby Pump manufacturing operations in New Jersey to be centralized in the company's plant at 49th & Harrison Streets, in Lawrenceville, Penn.

The Quimby Pump Company, Inc., was established in New York in 1893 and subsequently moved to its New Jersey plants, one in Newark and one in New Brunswick.

During 1943 the Quimby Pump Company was acquired by H. K. Porter and through expansion of its engineering and development work now manufactures a broad line of pumps used by industries and marine services.

John Owen

Lester F. Cox

John Owen, Lester F. Cox Named Vice Presidents of Thermoid

John Owen, of Yardley, and Lester F. Cox, of Morrisville, have been elected vice presidents of the Thermoid Company, according to Fred Schluter, president.

Cox, who is factory superintendent of the rubber division, joined Thermoid in 1929. He started with the production department as a scheduler of brake lining production. In 1937 he was made factory manager, rubber division. In 1938 he became factory superintendent, rubber division.

Owen, who went to Thermoid in 1942 from Austin-Western Company, began his career with the Trenton firm as assistant manager, industrial rubber products division. He was made manager of that division in 1943, at which time oil field products were set up as a separate division, also under his control. In 1945 he became assistant vice president of these two divisions.

Territorial Revisions Made By B. F. Goodrich Company

The Replacement Tire Sales Division of The B. F. Goodrich Company has had a territorial revision from four to five divisions. Five sales executives have been appointed in connection with the changes. L. T. Greiner is manager of the fifth division, the southwest area composed of Dallas, Houston, Kansas City, Oklahoma City, Omaha and St. Louis districts, all formerly in the central division.

A. C. Kelly is manager of the central division, succeeding Charles A. McGill, recently deceased. To the Chicago, Indianapolis and Minneapolis districts have been added Cincinnati, formerly in the southern district, and Cleveland and Detroit, previously in the eastern territory. Kelly has been manager of the Chicago district, in which position he is succeeded by Hugh Reichert, manager of the Buffalo district. George R. Empson has been named to replace him there. Hoyt Price will manage the Oklahoma City district, replacing Greiner.

Pacific Tube Company Purchases Government-Owned Facilities

Approval of sale to Pacific Tube Company of the government-owned facilities operated by that company during the past three and one-half years was announced November 13 by War Assets Administration.

Pacific Tube Company, located at East Los Angeles, produces cold drawn seamless steel tubing, welded steel tubing and cold drawn bar stock in various analyses and sizes.

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TRADING POST SECTION

ON PAGE 73 OF THIS ISSUE

Hercules Motor Corporation Opens West Coast Factory Branch

Hercules Motor Corporation have opened a direct factory branch in Los Angeles, in charge of W. W. Cromley, vice president of West Coast operations. His assistants are Oliver Kelly, Herbert Wirshing and Walter Batty, who will handle sales activities to manufacturers, dealers and the retail trade. The factory branch and headquarters are at 2065 East Thirty-Seventh Street. Warehouse facilities, also at this location, accommodate a complete line of Hercules gasoline and diesel power units and replacement parts.

U. S. Steel Plant's October Production Sets All-Time High

United States Steel Corporation's National Works at McKeesport, Penn., in October broke all production records, even those achieved during the war. Tons of ingots produced totaled 104,246, as against 103,349 tons in September, 1944.

The blooming mills turned out 84,305 tons, as against 83,287 tons in January, 1943. The seamless pipe mills manufactured 50,146 tons, breaking the old record of 46,225 tons in July, 1946. The pipe finishing division reported 50,068 tons, also breaking the July, 1946, record of 47,026 tons. A total of 51,125 tons of seamless pipe were shipped, as against 47,661 tons shipped in March, 1945. October was also a safe month, with not one employe suffering a lost-time accident. The plant has 6500 employes.

Plant Enlarged

Expansion of plant facilities is announced by Allied Steel Products Corporation, Tulsa, with the relocation of its plant on a ten-acre site at 2110 N. Lewis. Construction of the modern plant and installation of the latest type fabricating equipment are now virtually completed.

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